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The Engineering and Mining Journal

Vol. 94 NOVEMBER 9, 1912 No. 19

Mine Fires

The underground fires that occurred last month in the North Mt. Lyell mine, Tasmania, whereby 45 men were killed, and in the Bunker Hill & Sullivan mine, in the Cœur d'Alene, whereby one man was killed, draw renewed attention to the great danger, both to life and property, from subterranean conflagration. By an opportune coincidence, two important technical papers on this subject have lately been presented, one by George S. Rice (U. S. Bureau of Mines, technical paper No. 24), relating especially to fires in collieries; the other by George J. Young (Bulletin, A. I. M. E., October, 1912), on "Fires in Metalliferous Mines."

The historic fires in the Anaconda, Calumet & Hecla and Homestake mines are in the minds of all. These were especially destructive of property. The Anaconda fire is still burning, and the expectation is that it will continue to burn for many years, or until all the combustible matter in the bulkheaded "fire stopes" has been exhausted.

Referring to the chronology published monthly and annually in the JOURNAL, we find the following memoranda of fires involving loss of life during the last two years:

Jan. 14, 1911. Underground fire in the workings between the Modoc and the Butte & Ballaklava mines, Butte, Mont.; two men smothered.

Feb. 23, 1911. Fire in Belmont mine, Tonopah, Nev., resulted in death of 17 men.

May 4, 1911. Seven men killed by fire in Hartford mine of Republic Iron and Steel Co., at Negaunee, Mich.

Aug. 23, 1911. Fire in new shaft of Giroux Consolidated Mines Co., Kimberly, Nev., resulted in seven deaths.

The above list would be greatly extended if the fires resulting only in damage to property were added. We are now speaking solely of underground fires. Surface fires would constitute a further and long addition, and these may be as dangerous to the men underground as a fire originating in a stope or shaft station. Thus, in 1909 a fire destroyed a shaft house of the London mine of the Tennessee Copper Co. Burning timber fell down the shaft and cut off the egress of the miners, who made their escape through another outlet of the mine, demonstrating emphatically the soundness of the legal requirement that a mine should be provided with more than one outlet.

The causes of mine fires are numerous. In the presence of excessively dry timber, fire may be started by some trifling accident or piece of carelessness, and spread with surprising rapidity. Burning candles left in stopes on the departure of a shift are a danger. Recognizing this, the Anaconda Copper Mining Co. has a corps of inspectors, "fire-bugs" in the vernacular, to go through the stopes after the miners have gone. In the case of the Homestake fire, a piece of smoldering fuse has been given as the cause. In metal mines, blasting is a risk of minor importance, the conditions in this respect being different from those of a coal mine. Professor Young says that he knows of no authentic case where the flame of a blast has been responsible for setting timbers on fire. The short-circuiting and overheating of electric wires is a commor accident by which mine fires are started. According to the cable dispatches from Tasmania, the North Mount Lyell fire was started by an electrical accident. On June 11, 1912, the pump room of the Ward shaft, at Virginia City, Nev., was endangered by a fire caused by the short-circuiting and exploding of an oil switch on one of the pumps. In this case no fatalities occurred and no great damage was done. In most cases mine fires are attributed to "causes unknown," which may be paraphrased as "undetermined carelessness."

The safeguards against underground fires are, in the main, those that should be taken against fire anywhere, namely,

eternal vigilance and the exercise of common sense. Under the latter head comes the clearing away of combustible rubbish and the avoidance of carelessness with matches, candles and lamps. Experience has abundantly proved that a shaft should not be covered by a combustible building. It is best that it be not covered by any building at all, but where the severity of the climate creates the necessity for such, it should be of incombustible construction and combustible material should be kept out of it. The shaft itself being the main communication with the mine, and being timbered as a rule, should be made as nearly fool-proof as possible. Many shafts are fortunately wet. When they are not, they should be equipped with a sprinkling system, such as is installed in most of the modern factories of New England. The cost of such an installation is moderate and certain of the mining companies in the northern iron country have already adopted it.

Is Mining Languishing?

In view of the large mining-dividend payments, as chronicled elsewhere in this issue of the JOURNAL, we think it somewhat open to question as to how much mining is languishing. But if the alleged decadence of mining be real, we think there are other reasons for it than exhaustion of our mines, the exactions of the smelting trust, the extortions of the common carriers, or Federal interference; or disorder in Mexico.

Neglecting the somewhat uncommon cases in which a plant is built to sell to a trust, the ordinary factory or works is built because the builders like the business, and see in it the chance for a steady income and a gradually developing trade. While there are miners and prospectors of this same order, there are many whose sole object is to develop a good-looking hole in the ground and sell it to a sucker. For these people, owing to the more frequent employment of competent mining engineers to make examinations, mining is not so flourishing as heretofore. We hope it will remain so, and believe that if mining experiences another great boom it will be owing to the efforts of men who like mining, who see in it the chance for a legitimate, profitable business, who are working mines, not tenderfeet, and who wish to hoist ore, not stock quotations.

Ocean Freight Rates

One of the symptoms—perhaps it would be better to say the results—of the present conditions of activity all over the commercial world is the advance in ocean freights. Two or three years ago, tonnage was going begging and charters at low rates were available; but for some time past, a rapid change has been going on, and now the conditions are reversed. Tonnage is hard to get when it is wanted and rates have gone up to a point which is almost unprecedented.

This has especially affected heavy articles, which must be transported in large quantities, such as iron ore. Blast furnaces in the East, which have been accustomed to depend to some extent on foreign ore, will apparently have to cut out such ores from their mixtures for a time. In a recent charter reported of a steamer to carry iron ore from Spain to Philadelphia, the agreed rate was over $3 per ton, which is almost prohibitive. Moreover, there seems to be no present prospect of a decline.

The high freights affect other articles, though to a minor degree, as their intrinsic value is greater in proportion to the freight charges than in the instance given. They are sufficient, however, to have at least a perceptible influence upon the markets.

An Educational Aristocracy

The U. S. Civil Service Commission has advertised for a chemist to study the physical-chemistry of smelting operations, specifying qualifications, which, in our opinion, embody wrong ideas. As advertised, the position is to be open only to those of educational training equivalent to that required for the degree of Ph.D. in an institution of recognized standing.

As to who is competent to determine when an institution is of recognized standing or not, we shall not debate at length, but will at least point out that wherever the line is drawn, the fact will remain that an excellent student from a poor institution would be of more value than a mediocre student from a good one. It might further be argued that judging from the storm of protest raised by Doctor Babcock's recent grading of the collegiate institutions of the country, and the explanations of it already found necessary by its sponsors, the time is not yet come when the colleges themselves can be definitely graded in relative status in the way they decimally grade their own students.

But the point remains, we believe, that to establish a preliminary requisite of university training, which would appear to outweigh any technical work and attainments after leaving college, is an unwise policy. In this connection it is worth while to call attention to the fact that many of the world's greatest engineers have been devoid of educational training in any university at all. Their university has been their study (bedroom, kitchen, etc.), illuminated by midnight oil after the day's work in shop or mine. Many of the learned and engineering societies which require high professional qualifications for their members, perhaps even as high as are needed for work in a government bureau, do not stipulate where the learning of their members should be acquired. Is it too much to expect that in gathering together a technical staff, even a government bureau should use common sense?

The British iron trade is showing even more activity than our own. Orders are plentiful and the mills are, as a rule, actively employed. This has been accompanied by a general rise in prices, which are in most lines above the parity of our own quotations. Thus Cleveland pig is quoted at $16.32 and hematite, or bessemer $19.20 per ton; while plates and bars have been quoted as high as $38.50, with other material in proportion. A good part of the increase in demand and prices is due to the great activity in the shipbuilding trade. The orders for new ships have been due to the call for ocean tonnage and the high rates prevailing for some two years past.

Complaints of a scarcity of labor are common in the iron trade at the present time. In finishing mills, at blast furnaces and coke ovens and at ore mines the story is much the same. Operations are limited because men enough cannot be found to do the required work. This does not look like hard times or any immediate anticipation of them. At some works also improvements or additions to capacity are held up from the same cause. The situation seems to be growing more, rather than less, acute.

By the Way

Woodrow Wilson has been elected President. The effect here will be that we will work harder than ever to boom the mining and metallurgical industries.

Passenger traffic was delayed and coal and freight traffic temporarily abandoned on the Bowman's Creek branch of the Lehigh Valley R.R. this morning by a mine cave-in, which swallowed several cars of a freight train, says a Wilkes-Barre dispatch of Nov. 1. The engine of the freight passed safely over, but the trainmen, looking back, saw freight cars disappearing. Investigation showed that they had fallen into a mine cave-in 25 ft. deep. Several cars piled up in this cave-in, and until the company can fill the hole it will be impossible to open the line for coal and freight traffic.

For some weeks back we have been reading in the daily and financial papers that "electrolytic copper is still held with confidence at 17¾c. by leading sellers, but some second-hand lots might be obtained at a shade below that figure." This suggests some new definitions: *First-hand copper.* All that is reserved for 17¾c. Syn., virgin copper, real copper. *Second-hand copper.* All other kinds. Syn., job lots, junk, unreal copper. Both kinds may be turned out by the same refinery, even by the same furnaces, but that does not matter. *Leading sellers.* Those who participate in the concert of price-pegging. *Second hands.* Everybody else. This is not quite complimentary to some agencies.

In the old mining days, writes an engineer, timbermen had to come to surface and select their own timber and ride down in the skip with it. In one of the Copper Country mines there were two gangs of timbermen, one Cornish, the other German, and a great deal of rivalry existed. One day while the "Cousins" were sending down timber, two of the Germans rode down with the first load and at the second level the rope broke. A spectator seeing something was wrong called to the "Cousins" at the collar of the shaft: "What's wrong?" "Skip gone down without the string to it." "Any one in the skip?" "Yes, planks, wedges and two Dutchmen—planks and wedges belong to we."

Some of the sharp-eyed young men employed by the Democratic National Committee discovered that the John D. Ryan who had contributed $5000 to the campaign fund was the president of the Amalgamated Copper Co. It was not officially announced, says the *Evening Post,* but there seemed to be no doubt that, under the eligibility rules, Ryan's contribution would have to go back. It has been stipulated that no money should be received from a corporation, nor from any officer of a corporation likely to need the help of the government in the way of legislation. Ryan, in the course of a few days, will probably receive a polite note in his mail, saying that the committee appreciates his generous spirit, but has to return his check.

The war of words over the present copper market is less sanguinary and more amusing than some others. The Boston *News Bureau* quotes a prominent producer, who has been underbid on recent business, as saying: "We can hold out until Christmas at 17¼, and I believe that this is the sentiment of all the leading producing interests." The situation has been stated in the following words in the *Wall Street Journal*: "The guerillas of the copper market, that is to say, the small and second-hand dealers, are offering electrolytic, delivered, 30 days, as low as 17⅜c. a lb., which naturally rencers the 17¾c. peg price of the large interests a nominal quotation"; to which the *Journal of Commerce* adds in reply the question: "What about the highwaymen who hold up consumers for the benefit of copper-security speculators?"

There has been considerable success in the Michigan iron regions during the last few years, in taking over abandoned, "black-eyed" properties, where exploration had been carried on only at shallow depths, and drilling deeper for ore. In this connection, a story is related of the Sherwood exploration, at Iron River. Diamond drilling had been going on for some time with poor results; the holes had struck plenty of iron formation, but the material was too lean to make merchantable ore. When the holes penetrated to the underlying formation, which was altogether barren, they were stopped by the management. On one occasion, the manager was away and no one with authority was present to stop a hole that had got into the underlying formation. The drill contractors, who were paid by the foot, kept merrily on. By the time the manager had returned, the drill had gone through the barren formation into a good-sized body of high-grade ore!

The U. S. Civil Service Commission announces that there will be a physical-chemist appointed for service with the Bureau of Mines in the Western states, at a salary from $1800 to $3000 per year, to conduct investigations in the physical-chemistry of smeltery operations. Applicants will be graded on general education and scientific training, 40 points; professional experience and fitness, 35; published or manuscript reports, 25 points. An educational training equivalent to that required for the degree of Ph.D. in an institution of recognized standing, such training to include special courses in physical-chemistry, and at least one year's practical experience in a chemical or metallurgical laboratory, will be prerequisites for this position. Applicants must be between 25 and 40 years of age. Persons who meet the requirements and wish to apply for the examination should at once apply for Form 304 and special form to the U. S. Civil Service Commission, Washington, D. C., mentioning announcement No. 827, chemical engineer (male), Nov. 25, 1912. To be considered the application must be filed by Nov. 25, 1912, together with all material required.

According to the 13th census, the total acreage of all land in the United States belonging to producing mines was 24,216,000 acres. Not all of this area was in use nor was all of it mineral and oil land, 1,139,000 acres being timber land and 1,662,000 acres were in use for buildings and other purposes. Of the total area above mentioned, more than one-half (12,695,000 acres) was connected with the petroleum and natural-gas industries. Coal land was divided as follows: Bituminous, 7,717,000 acres; anthracite, 465,000 acres. Iron mines were third in extent, the holdings amounting to 1,313,214 acres; the mines producing precious metals controlled 588,263 acres; the mineral land of the copper industry amounted to 126,851 acres, besides which it owned timber and other lands aggregating 148,747; the lead and zinc mines embrace 125,322 acres. Of the total area controlled, 38.8% was owned by the operators, the remainder being held under lease. The percentage of owned land, however, is much reduced by conditions in the petroleum and natural-gas industries, where 94.6% of the land is leased.

The St. Joseph and Doe Run lead companies are experiencing an internal rumpus, Robert Holmes, of St. Louis, having issued a circular to the stockholders, charging the management with various sins of commission and omission and asking for proxies so as to fix things; to which President D. A. Jones, of New York, has replied in a pamphlet. Dismissing minor issues, the cause of the trouble is to be found in the unsatisfactory earnings of these companies in recent years and the decline in the value of their shares. It has been well known that they have had to borrow large sums of money, which previously had never been necessary in their long and successful history. This manifestly may be traced back to the same old mistake of corporations, i.e., failure to reckon amortization, living on principal, etc. The day comes when plant has to be discarded and there are no funds to replace it; hence recourse to the money lenders. Besides this the company has expended a large sum in the purchase of new ore lands, wisely in the opinion of its management. The mining, milling and metallurgical improvements that are now being consummated will no doubt put the companies on a good footing again before long.

Correspondence and Discussion

Views, Suggestions and Experiences of Readers

Colorado School of Mines Experimental Plant

I have read with a good deal of interest and pleasure what you said about our experimental plant in the JOURNAL of Oct. 5, 1912. For the last six years I have been struggling to make a success of the plant and now feel that this success is in sight. We have had many difficulties to overcome and many criticisms to answer. When thoughtful criticisms were made, we have endeavored to adjust our plans so as to remove the cause for criticism.

We expect to have most of our equipment installed by the first of December. Soon after that date we shall be ready to do experiment work. We have arranged so that experimental work can be done either on full-sized commercial scale, or upon 1000-lb. lots, or upon a small laboratory scale. By this means we hope to satisfy any demand that may be made upon us.

VICTOR C. ALDERSON.

Golden, Colo., Oct. 22, 1912.

Settling El Tigre Slimes

In the JOURNAL of Oct. 5, 1912, there appeared an article entitled, "Settling of Slimes at the Tigre Mill," in which the author claims to have discovered various laws governing the settling rate of slimes. The laws, as set forth in this article, are entirely different from the accepted principles of settling and are also at variance with what has been previously published on the subject. The matter of settling is of such vital interest to the metallurgist, engaged in wet methods of reduction, that a discussion of the subject at this time cannot be amiss.

Briefly stated, the general import of the article referred to, is that the settling rate of dilute slime is independent of the depth of the settling vat, that the settling rate of thick slime increases with the depth, and that the settling results, to be expected in mill practice, may be predetermined by laboratory tests.

There seems no reason to doubt that these principles may be true at the Tigre mill; but the settling of slimes is so erratic and varies so greatly at different mills, that it seems premature to accept these principles as general for all mills and all kinds of slime. That the principles are not true in some cases is shown by the fact that various writers have noted that laboratory tests generally indicate a much higher rate of settling than can be secured in actual practice. This has become so much the concensus of opinion that mill designers generally disregard laboratory tests and base their calculations, as to settling capacity required, upon tests in full-sized vats, or upon comparisons with other plants treating approximately the same nature of slime.

Two cases of the unreliability of laboratory tests have come under my personal attention. Test 1 was made on a sandy slime, of the nature encountered in an all-slime cyanide plant. The pulp contained 59% moisture before settling commenced. In a treatment vat, 12 ft. deep by 34 ft. diameter, it required seven hours to settle this pulp to 46% moisture. A five-gallon oil can full of this same pulp settled to 46% moisture in 45 min., showing a great advantage in favor of the shallow laboratory vessel.

Test 2 was made on a dilute pulp, derived from the slime overflow of a series of Wilfley tables. The slime contained 90% moisture and was settled in a cone-bottom tank, 16 ft. diameter and 10 ft. average depth. It required 17 hr. to settle to 81% moisture in the vat and only two hours to settle to the same final thickness in a five-gallon oil can. Both the above tests indicate a much greater rate of settling in the shallow oil cans than in the deep settling vats. In these two cases, at least, the principles in the article referred to in nowise hold true.

C. H. JAKIN

Los Angeles, Cal., Oct. 24, 1912.

Parks' Electrocyanide Process

The article, in the JOURNAL of Aug. 10, 1912, descriptive of the Parks' electrocyanide process has given the impression among mining men throughout the West that this process is in use at the Whitman mine. I have had a number of inquiries from Mexico, Texas, Wyoming, and other states asking for information. The only connection this company ever had with the Parks' process was in having a test made on some of the Whitman ore. The process was not adopted, and consequently any information as to the adaptation of this process would be of little value when coming from this source. The article mentioned was extensively circulated and read through the JOURNAL, and I would appreciate the favor very much if the JOURNAL could mention the fact that the Parks' process is not in use at the Whitman mine.

J. M. LILLIGREN.
General Superintendent.

Pearl, Idaho, Oct. 25, 1912.

Selenide of Gold

I do not know whether the following experiments will throw any light on "Selenide's" inquiry, in the JOURNAL of Oct. 19, 1912, but at one time I prepared some material by precipitating $AgNO_3$ with the gas evolved by treatment of aluminum selenide with water.

The precipitated material was dried on a water bath, thoroughly mixed, and 500-mg. portions weighed out for assay. One portion was assayed by wet assay, Gay-Lussac method, another was cautiously roasted and assayed by wet assay, the third run by corrected fire assay, with no allowance for retention of impurities by the assay button.

	Ag found
Wet assay	363.63
Roasted	361.38
Corrected Fire Assay	361.64

The correction in the last assay was 13.24 mg., which is abnormally high on assay buttons of that size, while the true loss considerably exceeds what should have been found under the furnace conditions under which I worked. From this one would conclude that selenium does give rise to volatilization losses with silver, and also has some tendency to carry silver into the slags and cupels of an assay, which tendencies would probably be manifested in large-scale working.

Other experiments were performed, taking the Gay-Lussac assay as showing the correct amount of silver present, and making up mixtures consisting of silver selenide and lead foil, and of proof silver equal to the silver contents of the selenide taken, and an equivalent amount of lead foil, and these mixtures cupelled direct. The selenide cupellations lost about 0.45% more than did the checks.

A precipitate was produced by passing H_2Se through gold chloride solution and this precipitate assayed. Assuming the precipitate was Au_2Se_3, although I realize this assumption is open to question, and running proof assays alongside, equivalent to the assumed contents of the Au_2Se_3, the losses were over three times as large in the selenide as in the metal.

SELENITE.

New York, Oct. 28, 1912.

Iridium in American Placer Platinum

By Frederick W. Horton*

The possibilities of an iridium supply in the United States. Analyses of commercial lots of crude platinum from various fields showing predominance of iridium over platinum in certain districts. A comparison of crude platinum from the United States, Russia, Colombia and other countries.

*Mining engineer, 207 Ouray Building, Washington, D. C.

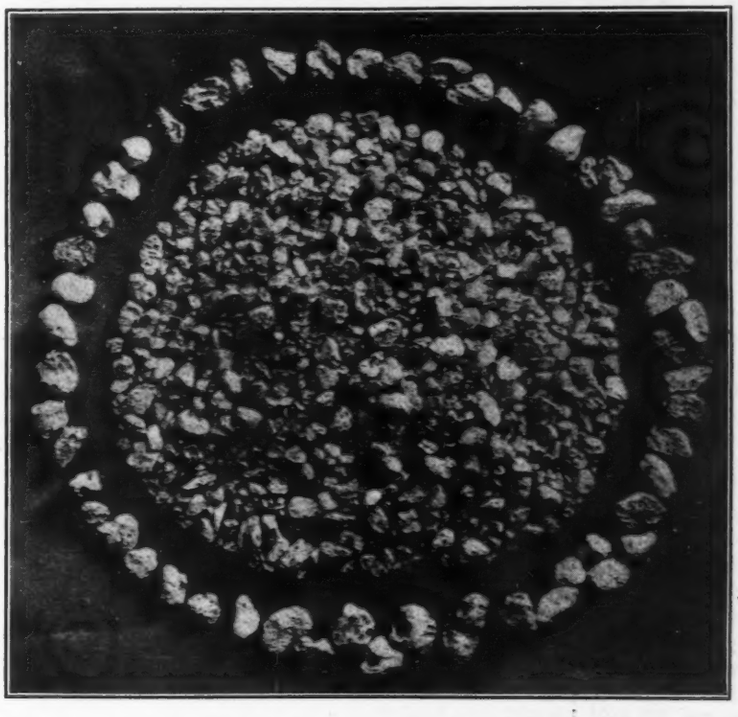
The unprecedented and ever-increasing demand for the various alloys of platinum and iridium, commonly known as hard metal or hard platinum, coupled with the limited production of both the component metals, has resulted in an almost uninterrupted rise in their price. In September, 1908, refined platinum was sold at $17.50 @19 per oz., and iridium at about $30 per oz., whereas in the last issue of the JOURNAL platinum is quoted at $45.50 per oz. and iridium at $68@70 per oz. The extraordinary demand which has more than doubled the price of these metals and made iridium over three times as valuable as gold, has come largely from the jewelry trade. The unquestioned superiority of hard platinum as a setting for diamonds, pearls and light-colored precious stones, both from an artistic standpoint and from that of durability and safeness of setting, together with the high price of the alloy, has made it extremely fashionable. This demand on the part of the jewelry trade is now firmly established and is particularly responsible for a demand for iridium that greatly exceeds the supply.

PROPERTIES OF IRIDIUM AND PLATINUM-IRIDIUM ALLOYS

As intimated by the name "hard metal," iridium is alloyed with platinum to increase its hardness and strength, and articles made from the alloy are much more durable than those made from pure platinum, which is too soft for many purposes. Iridium not only makes a hard alloy with platinum, but it gives the alloy a greater electrical resistance and higher fusing point than that of pure platinum, and is, therefore, used in resistance coils and also in thermo-couples for the measurement of high temperatures. The proportion of iridium in the alloy ranges from 5 to 25%, rarely exceeding the latter figure except in the case of special alloys where great hardness is desired. Alloys containing less than 10% of iridium are ductile and malleable, while those containing from 10 to 25% are hard and more difficult to work as the proportion of iridium increases. Where the alloy contains 30% or more iridium, it is no longer attacked by *aqua regia*.[1]

Pure iridium is the hardest known metal. It is of a lustrous white color, and about 16% heavier than gold, having a specific gravity of 22.4. Its fusion point, which is extremely high, is variously stated at from 2150° to 2250° C. It is brittle when cold and only slightly malleable at a white heat. Iridium is not attacked by any of the ordinary acids or bases, and is insoluble in *aqua regia*. These properties of extreme hardness, high fusing point, and insolubility render it particularly adapted to certain uses, as, for example, in the making of knife edges for delicate balances, standard weights, pivots, contact points, etc. Pure iridium is, however, difficult to work on account of its brittleness, and is, therefore, generally alloyed with a small percentage of platinum even when great hardness is desired. The natural alloy of iridium with osmium, iridosmine, or as it is sometimes called, osmiridium, is, on account of its extreme hardness, used for watch and compass bearings and for tipping fountain-pen points.

[1]Moissan, H., Traité de chimie minérale, Vol. V, p. 899.



NUGGETS OF IRIDIUM AND PLATINUM-IRIDIUM, TRINITY RIVER, CALIFORNIA—ONE-HALF NATURAL DIAMETER

IMPORTS AND PRODUCTION

The iridium used in this country is obtained chiefly from Russian crude platinum, which generally contains from 1 to 3% of the metal. Similar small percentages of iridium are also obtained from the crude platinum which is imported from Colombia, and this amount is supplemented by an annual domestic production of 100 or 200 oz. Formerly, considerable iridium was obtained in Russia from osmiridium coming from placer deposits at Miassk, in the Government of Orenburg, in the Urals. In 1910, however, there was practically no production from these deposits, the output amounting to only 5 oz. Furthermore, the total production of osmiridium in Russia during the last 10 years is officially reported as only 308 oz. According to the Bureau of Statistics, the total imports of "iridium and iridium in native combination with platinum metals" into the United States in 1911 amounted to 3905 oz., valued at $210,616, or about $54 per oz., as compared with imports of 122,390 oz. of unmanufactured platinum, valued at $4,722,752.

In other words, notwithstanding an unsatisfied demand, less than 3.2% as much iridium as platinum was imported, and this because no more could be obtained. Just how small the available supply of iridium is, may, therefore, be readily understood. Nevertheless, the demand for iridium steadily increases, notwithstanding its rapidly advancing price. This fact is borne out by the statement of the Russian correspondent of the JOURNAL, under date of Oct. 10, 1912, that at Ekaterinburg, the primary market for platinum in the Urals, the demand for iridium was

exceedingly strong, but that the offering of the metal was insignificant.

Iridium Minerals

Iridium is found associated with platinum and other metals of the platinum group. Rarely it is present as native metal, but more often as an alloy with osmium or platinum. The natural alloy with osmium, iridosmine or osmiridium, has a hardness of 6.7 and a sp.gr. of 18.8 to 21.12. In color it is a tin-white to steel-gray. Two varieties of this alloy have been named, based on its occurrences in Russia, viz., newjanskite, with over 40% iridium, and sisserskite, with less than 30% iridium. Sisserskite has a slightly higher specific gravity than the newjanskite.

The extremely rare mineral, platiniridium, is developed with a large increase in the iridium content of the normal natural alloy with platinum, which does not exceed 5%. Platiniridium sometimes contains over 75% of iridium. It is white, has a metallic luster, a hardness of 6.7, surpassing platinum, and a specific gravity of 22.6 to 23, being thus the heaviest known mineral.

Occurrence in the United States

While most readers of the Journal know that a small percentage of iridium is generally found in the small quantities of crude platinum which are produced annually in the United States as a by-product of placer mining, I believe that they are, perhaps, not cognizant of the high percentage of iridium associated with the crude platinum from certain districts in this country or the comparatively large amount in which the metal might perhaps be obtained if the potential sources of supply were thoroughly investigated.

The accompanying illustration shows, reduced one-half in diameter, a lot of nuggets, weighing about 27 oz., obtained from a placer mine on the Trinity River, near Junction City, Trinity County, Calif. These are not gold nuggets but nuggets of osmiridium and platinum, and the entire lot, upon analysis, showed 69.7% osmiridium, 22.7% platinum, and 0.4% gold.

The coarseness of the material is exceptional and will surprise those not familiar with the occurrence of crude platinum in this district, and whose ideas as to the size of the grains in which crude platinum of domestic origin is found are based on samples coming from the dredging fields of Butte, Yuba and Sacramento Counties, Calif., or the beach sands along the coast of northern California and Oregon. The largest nugget in the lot weighed over 13 dwt., or almost three-fourths of an ounce, and as far as known is the largest nugget of osmiridium ever reported. The lot as a whole represents the actual run of material as it was recovered from the ground and is not a lot from which the fine material was screened out. The actual constitution of these nuggets is a matter of interest. It was found upon treating one of them with *aqua regia* that it disintegrated; platinum, iron and small amounts of copper and gold, etc., going into solution and leaving a little heap of small, flat grains of osmiridium undissolved. The nuggets, therefore, would seem to consist of osmiridium cemented by platinum. Unfortunately, a more exhaustive analysis was not made on this material, and, therefore, the exact percentage of iridium which was contained in the osmiridium cannot be definitely stated. A complete analysis was, however, made on a second large lot of material obtained from a placer mine, at China Flat, Humboldt County, Calif., about 50 miles down the Trinity River from the place where the lot shown in the illustration was obtained. This lot weighed 535.5 grams, or over 17 oz., and was analyzed as shown in the accompanying table:

CHINA FLAT CRUDE PLATINUM

Metal	%
Osmiridium	74.883
Platinum	17.640
Iron	6.376
Copper	0.568
Gold	0.074
Nickel	Trace
Chromium	Trace
Palladium	None
Total	99.541

The osmiridium, which was left after treatment with *aqua regia* weighed 391 grams and constituted 74.88% of the original material. It had a specific gravity of 18.53 and was separately analyzed to find its composition, which was as shown below.

OSMIRIDIUM ANALYSIS

Metal	%
Iridium	55.04
Osmium	44.28
Iron	0.59
Silica	0.09
Rhodium	None
Ruthenium	None
Total	100.00

The high-iridium content of the osmiridium and the specific gravity of the mineral showed that it was the variety known as newjanskite. Particular attention is called to the fact that the osmiridium did not show traces of either rhodium or ruthenium, whereas 12 analyses, as given by Kemp[2], show rhodium in every case and ruthenium in six instances, the percentage of rhodium ranging from 0.5 to 12.30, and the percentage of ruthenium ranging from 0.2 to 8.49. Neither could any palladium be found accompanying the platinum, which is also a point worthy of note, as some small percentage of palladium is almost universally present in platinum. By combining the two analyses given above, the composition of the original lot of crude platinum was found to be as given in the accompanying table:

ULTIMATE ANALYSIS, CRUDE PLATINUM

Metal	%
Iridium	41.216
Osmium	33.158
Platinum	17.640
Iron	6.818
Copper	0.568
Gold	0.074
Nickel	Trace
Chromium	Trace
Silica	0.067
Total	99.541

It will be noted that the lot contained 41.216% of iridium, as compared with 17.64% of platinum.

Two other samples of crude platinum, one weighing 64.27 grams and one 47.63 grams, obtained from a locality on the Trinity River, about five miles north of China Flat, were analyzed with the following results:

TRINITY RIVER CRUDE PLATINUM

	No. 1 %	No. 2 %
Osmiridium	73.52	71.33
Platinum	21.20	21.10
Iridium	0.27	0.52
Gold	0.07	0.97
Copper	0.19	0.50
Silver	0.04	0.12
Iron	4.69	5.40
Total	99.98	99.94

The four analyses given above were not made on picked samples or on single nuggets, but on commercial lots of crude platinum obtained from widely separated localities along the Trinity River, and their results were confirmed by analyses of numerous small samples obtained from other places along the river, viz., near Hawkins Bar, Taylor Flat, French Creek, Big Bar, Helena, etc. The analyses show that the crude platinum from the placer deposits on this river from a point at least five miles above Junction City and thence down stream over 50 miles, contain in general from 69 to 75% of osmiridium, of which over 50% is usually iridium, and that considered as a whole, the crude platinum contains approximately 40% of pure iridium, as compared with 17 to 22% of platinum. In other words, the gravels throughout this area contain almost twice as much iridium as platinum. I also believe this to be true of the gravels in the Hay Fork area, which is situated about 20 miles southwest of Weaversville, Trinity County, and embraces the entire valley of Hay Fork Creek. Unfortunately only two small samples of crude platinum from this region have been obtained by me, and, of course, their analyses do not suffice to confirm this opinion definitely. The two samples which have, however, been analyzed, contained three or four times as much osmiridium as platinum.

There is, then, at least one considerable area and probably two in Trinity County, Calif., where the gravels contain approximately twice as much iridium as platinum. The question immediately

[2]Geological relations and distributions of platinum and associated metals. U. S. Geological Survey, Bull. 198, p. 21.

arises: Are there any undiscovered deposits that are rich enough to be worked commercially either for iridium, platinum, osmium, etc., alone or in connection with gold?

The Trinity River basin has long been noted for its gold placers, which have been worked since the early '50's, and from these placers within the areas containing crude platinum large quantities of iridium, platinum, osmium, etc., have been produced.

Early Miners Threw Away Platinum

The larger part of the output was, however, thrown away by the early miners, who considered this "white metal," as they sometimes called it, worthless, and it has been only during the last few years that the value of these platinum metals has been well understood by the miners. Moreover, the richer gold placers along the Trinity River within the area where these platinum metals occur are at present largely exhausted, and the few hundred ounces that are now produced annually as a byproduct in gold mining go but a little way toward satisfying the domestic demand. However, is there not a possibility that in these areas there are gravels rich enough in the metals of the platinum group to be worked successfully where the gravel could not be mined at a profit for gold alone, and this because the gravels of the region have been prospected only for gold and without reference to their content of the much more precious metals iridium, platinum, osmium, etc., and that gravels well worth mining, particularly at the present price of iridium and platinum, may have been passed over because they contained little or no gold?

This query applies with equal force not only to the gravels of the district under discussion, but to the alluvial deposits in the entire serpentine and peridotite areas of the coast range, in northern California and southern Oregon. Although the larger part of such deposits are known to be entirely barren of gold, is there not a possibility that if these gravels were prospected, some deposits might be found that were richer in the platinum metals than those of any of the well prospected gold-bearing areas?

For purposes of comparison with the preceding analyses of crude platinum from Trinity County, Calif., the accompanying table of average analyses of crude platinum from Russia, Colombia, Brazil, British Columbia, Borneo, California and Oregon, is given. It will be noted that crude platinum from both the Nijni Tagilsk and Goroblagodat districts, in Russia, as shown by 20 analyses, contain less than 4.5% of combined iridium and osmiridium, and the same is true of crude platinum from Colombia, as shown by the average analyses of five samples from the El Choco district, and also of the one sample from Borneo.

The other analyses of crude platinum from New South Wales, British Columbia, Brazil, California and Oregon, show considerably more iridium and osmiridium, but in no case over 38%. In none of these samples, therefore, does the total iridium content approach that of the crude platinum from Trinity County, California. In general, however, American crude platinum shows a much higher percentage of iridium than crude platinum from either of the world's leading producers, Russia and Colombia, as is shown by the analyses of the five samples from California and Oregon.

The accompanying analyses of samples of crude platinum obtained by me from gold dredges near Oroville, Calif., show that in this district the crude platinum contains a considerable percentage of osmiridium, but, in common with other districts in the United States, less than half as much as the crude platinum of Trinity County.

CRUDE PLATINUM, OROVILLE, CALIF.

	Sample No. 1 %	Sample No. 2 %
Osmiridium	23.36	32.01
Platinum	65.66	56.19
Iridium	0.66	1.02
Gold	0.72	4.16
Total	90.40	93.38

ANALYSES OF AMERICAN AND FOREIGN PLATINUM[3]

	Russia		Colombia. El Choco District	California	Oregon	New South Wales	Borneo	British Columbia	Brazil	Australia. (Probably New South Wales)
	Goroblagodat District	Nijni Tagilsk District								
Iridium	0.33	2.44	1.44	1.70	0.40	1.30	0.66	1.14	27.79	1.65
Platinum	82.90	76.28	82.70	76.29	51.45	75.90	82.60	72.07	55.44	60.60
Rhodium	1.54	2.37	2.08	1.35	0.65	1.30	0	2.57	6.86	1.68
Palladium	1.24	0.22	0.93	0.99	0.15	0	0	0.19	0.49	1.65
Osmium	0.54	0.20	0.23	0.33	0	0	0	0	0	0.40
Ruthenium	0	0	0	0	0	0	0	0	0	0
Osmiridium	1.17	0.73	2.62	9.04	37.30	9.30	3.80	10.51	0	25.50
Gold	0	0	0.74	0.71	0.85	0	0.20	0	0	1.80
Insoluble	0.17	1.56	0	0	0	0	0	0	0	0
Iron	10.72	13.75	7.60	5.93	4.30	10.15	10.67	8.59	4.14	4.43
Copper	0.56	1.31	0.51	1.91	2.15	0.41	0.13	3.39	3.30	1.10
Sand	0	0	1.54	1.76	3.00	1.22	0	1.69	0	1.20
Manganese	0	0	0.08	0	0	0	0	0	0	0
Total	99.17	98.86	100.47	100.01	100.25	99.58	98.06	100.15	98.02	100.01
Number of samples analyzed to obtain average analysis	3	17	5	4	1	1	1	1	1	2

[3]Kemp—Geological Relations and Distribution of Platinum and Associated Metals—U. S Geol. Survey, Bull. 193, pp. 18-19.

American Institute of Mining Engineers

On Thursday morning, Oct. 31, the last technical session of the Cleveland meeting of the American Institute of Mining Engineers was held at the Case School of Applied Science. Owing to lack of time, the papers remaining to be read were allotted so many minutes each, and the ensuing discussions were brief. The following papers were presented: "On the Quality of Charcoal Iron, a Preliminary Paper," by J. E. Johnson, Jr., Ashland, Wis.; "Constitution and Melting Points of a Series of Copper Slags," by Charles H. Fulton, Cleveland; "Chemistry of the Reduction Processes in Use at Anaconda, Mont.," by Frederick Laist, Anaconda, Mont.; "Note on the Case Hardening of Special Steels," by Albert Sauveur and G. A. Reinhardt, Harvard University. The above papers were read in abstract while the following were read by title only. "The Development of the Reverberatory Furnace for Smelting Copper Ores," by E. P. Matheson, Anaconda, Mont.; "Our National Resources and Our Federal Government," by Dr. R. W. Raymond, New York, N. Y.; and "Recent Developments in Open-hearth Steel Practice," by N. E. Maccallum, Phœnixville, Pennsylvania.

The chief discussions centered about Mr. Johnson's and Doctor Raymond's papers. The former paper was illustrated with lantern slides and described the results of experiments conducted recently by the author and others on charcoal irons, with the object of determining the reasons, if possible, for the great variations in the quality of charcoal irons made not only in different parts of this country, but in different furnaces in a given district. In steel ingots and other steel products, it is now customary to apply certain accepted terms to particular spots, describing the composition, etc., of those spots. Mr. Johnson attempted to apply some of these terms to charcoal pig iron, and the discussion had to do with this, principally. It was contended by others, Doctor Howe for one, that such application is incorrect. Doctor Howe had prepared written discussion of this paper, which was read in abstract.

E. W. Parker, of the United States Geological Survey, read excerpts from a written discussion of Doctor Raymond's paper, in which he stated that he represented the Geological Survey, and its di-

rector, George Otis Smith. He took exception to some remarks of Doctor Raymond, saying that he had been misquoted in connection with statements that he had made in the past regarding the closing of coal mines. He does not advocate the closing of operating coal mines but suggests that new ones shall not be opened until such action is fully warranted.

E. G. Spilsbury, past-president of the Institute, voiced the sentiment of visiting members, when he moved that a vote of thanks be extended to the local committee for the entirely successful manner in which the conduct of the Cleveland meeting, including the comfort and pleasure of those attending, had been provided for. In adjourning, President Kemp remarked that the meeting would most certainly be recorded as an exceptionally strong one.

Business Affairs

The business affairs of the Institute consumed the entire session on Wednesday morning. Readers of the JOURNAL are undoubtedly familiar with many of the internal business and political troubles that have confronted the Institute recently, as these have been covered fully in these columns from time to time during the last year. Several committees have been appointed within this period to inquire into and to straighten out the affairs of the organization, also to outline, if possible, a future policy. A pamphlet constituting a revised constitution and new by-laws, the work of a committee composed of Joseph W. Richards, chairman, Charles Kirchhoff and Charles F. Rand, was presented to the meeting on Wednesday, with the announcement that while full discussion of the proposed changes was invited, no definite action could be taken until the adjourned business meeting in New York on Nov. 12, 1912.

Before any discussion took place, however, President Kemp gave a brief but comprehensive outline of some of the conditions that led up to the erection of the Engineering Societies Building. Before this, the Institute had purposely not been incorporated, but it became necessary to take such a step in order to acquire the ground on which the building was to be constructed. The present dual organization, objected to by many as being inefficient, is a direct outcome of this condition. Although heavy financial obligations were incurred in the construction of this building, these have been reduced to about $68,000, and it is expected that this will be still further reduced in a few months. President Kemp stated that great progress has been made toward a satisfactory reorganization by Charles Kirchhoff.

Mr. Rand read the most important changes in the constitution and by-laws that are proposed by the committee of which he is a member, and with two exceptions these seemed to be generally acceptable to the Cleveland meeting. However, Art. 4, which provides for the organization of a body to be called "Fellows of the Institute" aroused a discussion that became heated and general. The older members, with a few exceptions, appeared to be in favor of such a step, but the younger men were decidedly opposed to it. The arguments advanced by both sides were interesting and to the point, and in the course of the discussion the Institute was referred to as the "greatest democratic organization of its kind in the country." Whether or not the Institute should so amend its policy as to make it possible to take a positive stand on political questions affecting the mining industry was the cause of much discussion and some mirth, as it appears that the proposal to form the "Fellows of the Institute" will make probable the adoption of such a policy. Against the wishes of the committee, two votes were finally taken: One, that it be the sense of the meeting that Art. 4 be stricken out, was carried; the other, that it be the sense of the meeting that a body of fellows should be created, was lost.

Before this matter was closed, it was stated by a member of the Committee of Five, that its efforts were entirely unselfish, and had solely in view the betterment of the Institute's affairs; that much undue and unjust criticism had been published and heard, including an editorial in the ENGINEERING AND MINING JOURNAL in which the action of the committee, in regard to certain matters, had been characterized as "indecent." In the third by-law, relating to the duties of the secretary, a motion was carried that it be the sense of the meeting that the sentence reading "the Secretary shall devote his entire time to the affairs of the Institute," be stricken out.

The Western members feel that they are not sufficiently represented in the management of the business affairs of the Institute, and one, at least, went on record as demanding that a Western man be selected as the next secretary. It is proposed to remedy these conditions, however, by retaining the management in the board of control, as at present, but with an increase in the council, which, it is proposed, shall contain more Western men, the board to be governed largely by the influence of the council.

Entertainment Features

On Wednesday night, a subscription banquet was given at the Hotel Statler, which was attended by about 80 members. The speeches were largely impromptu. The first inspection trip took place on Wednesday afternoon, when a special train on the Baltimore & Ohio railroad took the visitors first to the Central plant of the American Steel & Wire Co., through whose courtesy the train had been provided, and thence to the Newburgh Steel Works, of the same company, where the party was shown through the steel plant and later through the large wire mills of the company at that place.

On Thursday afternoon, a number of automobiles took the members to the plant of the National Carbon Co., and afterward to the ore unloading docks of the Pennsylvania railroad.

September Operations at Goldfield Consolidated

During September, 1912, the total production of the Goldfield Consolidated Mines Co., according to the official report of the general superintendent J. F. Thorn, was 29,752 tons containing $433,938, or an average of $14.58 per ton, of which 28,800 tons was milled with an average extraction of 89.52% and 952 tons was shipped, of an average value of $22.38 per ton, the net recovery from all ore being $13.13 per ton. The total net realization to the company was $200,833, or $6.75 per ton.

GOLDFIELD CONSOLIDATED OPERATING COSTS FOR SEPTEMBER, 1912

Mining, including stoping and development	$3.78
Transportation	0.11
Milling	1.98
Marketing	0.05
General expense	0.48
Bullion tax	0.02
Marketing ore shipped	0.13
Total cost of operation	$6.55
Miscellaneous earnings	0.10
Net cost per ton	$6.45

During the month of September, 1912, 4612 ft. of development work was performed. The total cost of mining, development, transportation, milling, office and general expense was $6.45 per ton, distributed as shown in the accompanying table.

Several discoveries of considerable importance were made during the month. In the Combination mine the 136 BX stope on the second level was extended and produced 700 tons of ore that averaged $18 per ton. The 136-T raise through the western extension of the 136 orebody encountered ore, and 150 tons averaging $32 per ton was mined. The 246-C between the third and fourth levels, 450 ft. east of the shaft, produced 237 tons of ore averaging $140 per ton. While not very large, this orebody will produce several hundred tons of good ore. The 414-C raise produced 76 tons of $31.20 ore.

At the Mohawk, the No. 3 stope through the Sheets-Ish workings produced 3258 tons of ore averaging $12.20 per ton. The 170-stope on the 250-ft. level, and under the Sheets-Ish orebody produced 1395 tons of ore averaging $15.40 per ton. The 348 stope between the third and fourth levels was extended

south and produced 340 tons of ore averaging $90 per ton. The 490-R sill being cut on the intermediate, between the third and fourth levels, and about 200 ft. south of the 354 stope produced 611 tons of ore averaging $100 per ton.

At the Clermont, the downward extension of the 510 orebody in 571 drift between the 900- and 750-ft. levels produced 36 tons of ore averaging $38.20 per ton. 700-F stope between the 1200-ft. level of the Grizzly Bear and 1000-ft. level of the Clermont produced 448 tons of ore averaging $42.40 per ton. 603 stope between the 1000-ft. and 900-ft. levels of the Clermont produced 329 tons of ore averaging $26.20 per ton. The 802 stope on the 1300-ft. level produced 302 tons of ore averaging $25 per ton.

The 220 drift on the 200-ft. level of the Jumbo No. 2 was extended 100 ft. north through ore that averaged $50 per ton over a width of five feet. A raise in this orebody produced 100 tons of ore averaging $72.80 per ton. On the 300-level the south drift is being extended to connect with the downward extension of the 220 orebody. The raise through the 115 orebody from the first level of the Red Top, has been extended to the surface, and a glory hole started, which produced 1150 tons of ore averaging $25 per ton.

Mineral Production of Italy

According to official reports, there were 650 producing mines in Italy in 1911, of which 352 were sulphur; 88 zinc and lead; coal and oil shale, 35; iron, 31; graphite, 30; salt, 30; asphalt, 15; borax, 12; pyrites, 10; manganese, copper, mercury, oil and gas, 9 each; all others, 11.

The outputs of the principal items, arranged in order of descending value, were: Sulphur, crude, 2,682,766 metric tons; zinc ore, 139,719; iron ore, 373,786; lead ore, 38,458; lignite, 553,083; mercury ore, 97,803; asphalt and bitumen, 188,133; iron pyrites, 146,124; petroleum, 10,390; copper ore, 68,136; borax, 2648; rocksalt, 43,763; other salt, 17,251; graphite, 12,621 metric tons; natural gas, 9,021,000 cu.m.; copper pyrites (45% S, 1½% Cu), 19,149 metric tons; mineral waters, 35,320; manganese ore, 3515 metric tons.

There were 31,008 men and boys employed underground, of whom 1794 were under 15 years of age, and 15,993 persons employed above ground, of whom 639 were boys under 15; 639 were grown women, 808 classed as female minors over 15, and 121 as girls under 15 years.

Among quarry products, we note marble, 497,741 metric tons, valued at $4,647,000, and talc, 15,620 metric tons, valued at $115,000. Owing to quality, however, this output greatly influences the course of the talc trade.

October Mining Dividends

Dividends from United States mines for October, 1912, reach the extraordinary total of $9,987,861. Metallurgical, coal, iron, holding companies and other organizations allied to the mining industry, paid $5,355,477, and Mexican and Canadian companies paid $2,388,806, the latter also representing a high-water mark.

The copper companies continue their upward march, Ahmeek has gone on a $6 basis; Anaconda to $0.75; Old Dominion (holding), $1.25; Snowstorm, $0.03; and U. S. Smelting, common, to $0.75. These represent increases of from 20 to 50%. In the Canadian field, the holders of Consolidated Mining & Smelting stock were cheered by resumption of dividends on a 4% basis, after five lean years.

Mining dividends paid by United States mining companies making public reports amount to $53,170,274 for the first 10 months of the year, and for American mining, metallurgical and allied companies, to $147,505,868.

United States Mining Companies	Situation	Per Share	Total
Ahmeek, c	Mich.	6.00	300,000
Anaconda, c	Mont.	0.75	3,249,375
Am. Z. L. & S., l.z	U.S.	0.50	82,460
Arizona, pfd. B., c	Ariz.	....	53,842
Bunker Hill & Sull., l.s	Ida.	0.20	65,400
Bunker Hill Con., g	Cal.	0.05	10,000
Champion, c	Mich.	1.00	100,000
Chemung, c*	Mich.	6.16*	1,231,073*
Colo. Gold Dredging, g	Colo.	0.25	25,000
Copper Range Con., c	Mich.	0.50	196,723
Daly West, s.l	Utah	0.15	27,000
Fremont, g	Calif.	0.02	4,000
El Paso, g	Colo.	0.10	49,000
Frontier, z.l	Wis.	2.00	2,500
Golden Cycle, g	Colo.	0.02	30,000
Grand Central, g	Utah	0.05	25,000
Goldfield Con., g	Nev.	0.30	1,067,744
Homestake, g	S.D.	0.50	109,200
Iron Blossom, s.l.g	Utah	0.10	100,000
Hecla, l.s	Ida.	0.02	20,000
Kennecott, c	Alas.	....	2,000,000
Mammoth, g.s.c	Utah	0.15	60,000
Mary McKinney, g	Colo.	0.02	26,185
New Idria, q	Calif.	0.30	30,000
North Butte, c	Mont.	0.50	205,000
Old Dominion, c	Ariz.	1.25	205,000
Osceola, c	Mich.	3.00	288,450
Opohongo, g.s.l	Utah	0.02	17,980
Pittsburgh Idaho, l	Ida.	0.04	32,120
Pittsburgh Silver Peak, g	Nev.	0.02	55,800
Shannon, c	Ariz.	0.50	150,000
Snowstorm, c.g	Ida.	0.03	45,000
Tonopah-Bel., g.s	Nev.	0.25	375,000
Tonopah-Exten. g.s	Nev.	0.02½	23,586
Tonopah Min. g.s	Nev.	0.40	400,000
United Cop. Min., c	Wash.	0.01	10,000
United Globe, c	Ariz.	7.50	172,500
Wasp No. 2, g	S.D.	0.02	10,000
Wolverine, c	Mich.	5.00	300,000
Yellow Pine, z.l	Nev.	0.02	19,000
Vindicator, g	Colo.	0.03	45,000

*Dissolution dividend.

Coal, Iron, Industrial and Holding Companies	Situation	Per Share	Total
Am. Ag. Chem., com	U.S.	1.00	171,141
Am. Ag. Chem., pfd	U.S.	1.50	275,730
Am. Sm. Sec., pfd. A	U.S.	1.50	255,000
Am. Sm. Sec., pfd. B	U.S.	1.25	375,000
Consolidation Coal	Md.	1.50	299,148
Central C. & C., com	U.S.	1.50	76,875
Central C. & C., pfd	U.S.	1.25	23,437
Crucible Steel, pfd	U.S.	1.75	427,638
Gen. Chem. pfd	U.S.	1.50	150,000
Guggenheim Expl	U.S.	2.50	519,833
Harbison-Walker, pfd	U.S.	1.50	144,000
Island Creek, pfd	U.S.	1.50	75,000
National Carbon, com	U.S.	1.50	82,500
Old Dominion, c	Ariz.	1.25	366,555
Penna. Salt. Mfg	Penn.	3.00	300,000
Pitts. Coal pfd	Penn.	1.75	371,262
Sloss-Sheffield, pfd	U.S.	1.75	117,250
U.S. Sm. Ref. & M., com.	U.S.	0.75	263,328
U. S. Sm. Ref. & M., pfd	U.S.	0.87½	425,530
Westmoreland Coal	Penn.	3.50	150,000
Va-Car. Chem. pfd	U.S.	2.00	360,000
Vulcan Detinning	N.J.-Ill.	1.75	26,250

Canadian, Mexican and Central American Companies	Situation	Per Share	Total
Alacran, g. s	Mex.	2.00	4,800
British Columbia, c	B.C.	0.15	88,756
Buffalo Mines, s	Ont.	0.05	50,000
Con. Min. & Sm. of Can	B.C.	4.00	232,176
Crown Reserve, s	Ont.	0.05	88,441
Dom. I. & S., pfd	Can.	3.50	175,000
Dom. Steel Cor., pfd	Can.	1.00	345,896
Dom. Coal	Can.	1.00	150,000
La Rose, s	Ont.	0.12½	187,328
Lucky Tiger, g	Mex.	0.05	35,767
McKin.-Darr.-Sav., s	Ont.	0.10	224,769
Nipissing Mines, s	Ont.	0.37½	450,000
Nova Scotia S. & C., pfd	N.S.	2.00	20,600
Nova Scotia S. & C., com	N. S.	1.50	90,000
San Rafael, s	Mex.	0.90	2,160
Santa Maria de la Paz., s	Mex.	2.50	24,000
Standard, s.l	B.C.	0.02½	50,000
Timiskaming & H. B., s	Ont.	3.00	23,283
Timiskaming, s	Ont.	0.03	75,000
Wettlaufer Loraine, s		0.05	70,830

Chronology of Mining for October, 1912

Oct. 1—Wages increased 25c. per day at Mason Valley mines and smeltery in Nevada.—Nevada Consolidated increased miner's wages 25c. per day.

Oct. 2—Miners in Ely copper district, Nevada, went out on strike for increase in wages of 50c. per day and recognition of the Western Federation of Miners.

Oct. 3—International Smelting & Refining Co., refinery at East Chicago, Ind., started.

Oct. 5—Montana coal miners voted to accept the wage scale agreed upon by operators and representatives of the miners, whereby an increase in wages began Oct. 1.

Oct. 8—Fire in the Bunker Hill & Sullivan mine in the Cœur d'Alene district, Idaho; one life lost.

Oct. 9—Utah Copper Co., and other operators in Bingham Cañon resumed operations on a small scale, virtually signalizing the failure of the strike.

Oct. 12—Fire in the North Mount Lyell mine, Tasmania, imprisoned 90 and caused the death of about 45 men.—Kennecott Mines Co., operating the Bonanza mine in Alaska, declared a dividend of $2,000,000, making total dividends declared this year $3,000,000, or $500,000 more than the capitalization.

Oct. 14—Hollinger Gold Mines Ltd., of Porcupine, declared initial dividend of 3% payable Nov. 2.

Oct. 16—Vera Cruz, Mexico, seized by Feliz Diaz who proclaimed a revolutionary movement against the Madero government; only to be captured several days later by federal troops.

Oct. 17—Two Greek strikers killed by guards at the Steptoe Valley smeltery, whereupon Governor Oddie declared martial law in effect and called out state police to maintain order in the Ely District.

Oct. 19—New Ophir mill on the Comstock Lode, Nevada, began operations.

Oct. 20—Cuyuna-Mille Lacs company shipped first ore from the Cuyuna Range in Minnesota.—One hundred twenty men went out on strike at the Cobalt Townsite mine after being refused a reduction in working hours of from ten to nine.—One man killed and one injured by a landslide on the Queen mine property at Ymir, British Columbia.

Oct. 21—Julian Hawthorne, Albert Freeman, Josiah Quincy and William J. Morton pleaded not guilty to charge of using the mails to defraud investors in the Hawthorne mines in Canada.—United Metals Selling Co., entered the domestic lead market as sales agent for International Smelting & Refining Co.

Oct. 23—Owing to the spread of the fire in the North Mount Lyell mine the management decided to flood it.

Oct. 24—Nevada Consolidated resumed steam-shovel work at Copper Flat with two shovels.—Hoisting engineer at the White raise of the Bunker Hill & Sullivan mine in Idaho, lost control of skip and 12 men were dropped 200 ft. to the bottom; two men were seriously injured.

Oct. 25—Representatives of colliery proprietors and miners agreed upon an advance of one shilling per week in wages, affecting about 400,000 men in the collieries of North Wales and England, excepting Northumberland and Durham.

Oct. 29—Strike at Ely, Nev., declared off by an almost unanimous vote, the men to return to work at an advance of 25c. per day as originally offered by the companies.

Mineral Oil Exports

Mineral-oil exports from the United States in 1912 will show a larger total, both as to quantity and value, than in any earlier year. The quantity exported will, according to the latest figures of the Division of Statistics of the Department of Commerce and Labor, approximate 1800 million gallons, valued at 120 million dollars. The distribution of our mineral-oil exports extends over a wider area than perhaps any other single article of exportation. The countries and colonies to which it is exported exceed 80 in number. Europe is by far the largest customer, taking a little more than one-half of the illuminating oil, three-fourths of the lubricating, and over one-half of the gasoline and naphthas exported; while North America (chiefly Canada, Mexico, Panama, and Cuba) takes about two-thirds of the crude petroleum exported.

Of the more than one billion gallons of illuminating oil exported in the fiscal year 1912, the United Kingdom took 166 million gallons; Japan, 109 million; Germany, 92 million; China, 68 million; and British India, 57 million gallons. Of the 202 million gallons of lubricating oil exported in that year, 63 million gallons were sent to the United Kingdom, 25½ million to France, and 24 million gallons to Germany. Of the 171 million gallons of gasoline, naphthas, and other lighter products of distillation exported in 1912, 34 million went to Canada, 27 million to the United Kingdom, and 15 million to Germany. Of the 208 million gallons of crude mineral oils exported, 76 million gallons went to Canada, 37 million to France, 28 million to Panama, and 23 to Mexico.

The petroleum production of the United States made its highest record in 1911—9¼ billion gallons. The United States now produces practically two-thirds of the petroleum of the world.

Transvaal Mining Notes

During 1911, the development footage sampled in the East Rand Proprietary mines was 37,843 ft., which averaged 10 dwt. over 26.1 in. In the first half of 1912, 18,791 ft. were sampled, assaying 12.4 dwt. over 26.7 in. These results show a great falling off from previous years, and the ore reserves are being largely drawn upon to maintain the present profit of between £90,000 and £100,000 per month. The ore being milled is apparently of higher grade than that of the average reserves. The company is preparing to push development in the deep and poorer portions of the mine, and has ordered a set of eight high-pressure and multi-centrifugal pumps of 500 hp., each pump to be capable of lifting 60,000 gal. of acid mine water per hour from 1150 ft. vertical depth. These pumps will be installed in pairs to raise water from the Angelo Deep shaft, from 4000 ft. vertical depth.

A company has been formed to mine and retort oil shale occurring near Ermelo, in the eastern Transvaal. Bore holes and shafts have shown the presence of four seams of oil shale from four to 24 ft. in thickness, occurring with two seams of coal five feet wide to a depth of 450 ft. The shale contains from 27 to 40 gal. of crude oil, which retorts from 60 to 75% marketable oil, and from 45 to 65 lb. of sulphate of ammonia per ton. The mines will afford a splendid market for the oils and the sulphate of ammonia will be most valuable as a fertilizer. There seems a good prospect that this shale can be worked to a profit, as working facilities are excellent and the property of 2400 acres is close to the railway.

Swaziland is a crown colony lying to the east of the Transvaal. Its chief mineral is alluvial tin ore. The Swazi Tin Mining Co. won 280 tons last year by hydraulicking and sluicing.

On the north the continuation of the Barberton gold-bearing series is met and the Piggs Peak mine is proving itself an important producer, the profits of which are increasing. Lately a new orebody was crosscut, assaying 10 dwt. over a width of 40 ft. In a recent month the Piggs Peak mine crushed 3300 tons for a yield of £5200 and a profit of £3160. The mine is worked from an adit 4000 ft. into the mountain. It is equipped with 25 stamps, a tube mill and Wheeler pans, and the ore, which contains much iron and copper pyrite, is concentrated on Buss tables and vanners. Power is supplied from a hydro-electric plant, seven miles distant. A 90% extraction is obtained by cyaniding concentrates and tailings separately. Development is three years in advance of the mill.

The De Beers Co., which owns the Kimberley mines, and has a virtual monopoly of diamond production in British South Africa, outside of the Premier mine, has taken over the Voorspoed mine in Orange Free State. This mine was a promising one, but owing to labor troubles and errors in regard to the treatment plant, work was stopped. The shareholders have their debt of £120,000 paid and get 12s. 6d. per share in 4½% debentures. The mine is, no doubt, worth more than this. It will probably be kept closed at present to regulate the diamond output to suit De Beers.

The City Deep mine, which was the cause of so much disappointment last year, is now giving good results, £20,000 profit being made per month. Last quarter's development on the main reef leader showed a value of 105s. over 20 in. The chairman of the Chamber of Mines stated that the reduced coal rail freights granted by the government would save the mines £200,000 per year, and other reductions another £200,000.

Moore Wins Filter Litigation

The Moore Filter Co. has received notification from the clerk of the U. S. Circuit Court of Appeals, sitting at Philadelphia, that Judge Buffington has handed down a decision in its favor in the case of the Moore Filter Co. vs. the Tonopah-Belmont Development Co., Tonopah, Nev. The case involves the use of the Butters filter and the decision of the higher court reverses the opinion of the U. S. District Court, given at Trenton, N. J., in February, 1912. The latter decision, in which the charge of infringement was not sustained, was reported in the JOURNAL of Mar. 2, 1912. Copies of the recent decision have not yet been received, so details are not available for this issue.

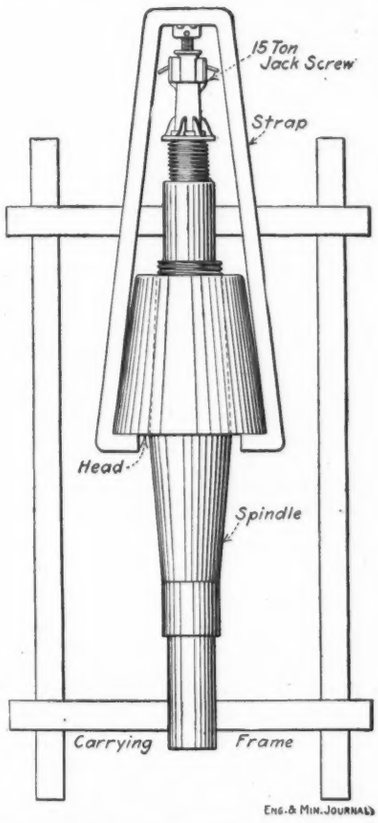
In 1911 there were 93 dredges working in New Zealand, 31 of which were owned by registered companies and paid dividends amounting to £45,198, according to the official report of the minister of mines.

Details of Practical Mining

Accounts of Useful Ways of Doing Many Things in the Day's Work

Removing Gyratory Crusher Heads

It is sometimes difficult to remove chilled-iron crusher heads from the spindles as they are usually carried directly on the spider. Manganese-steel heads, however, come off more easily as they are generally carried on an auxiliary cast-iron head. The method most commonly used to remove the chilled-iron heads is to blast them.



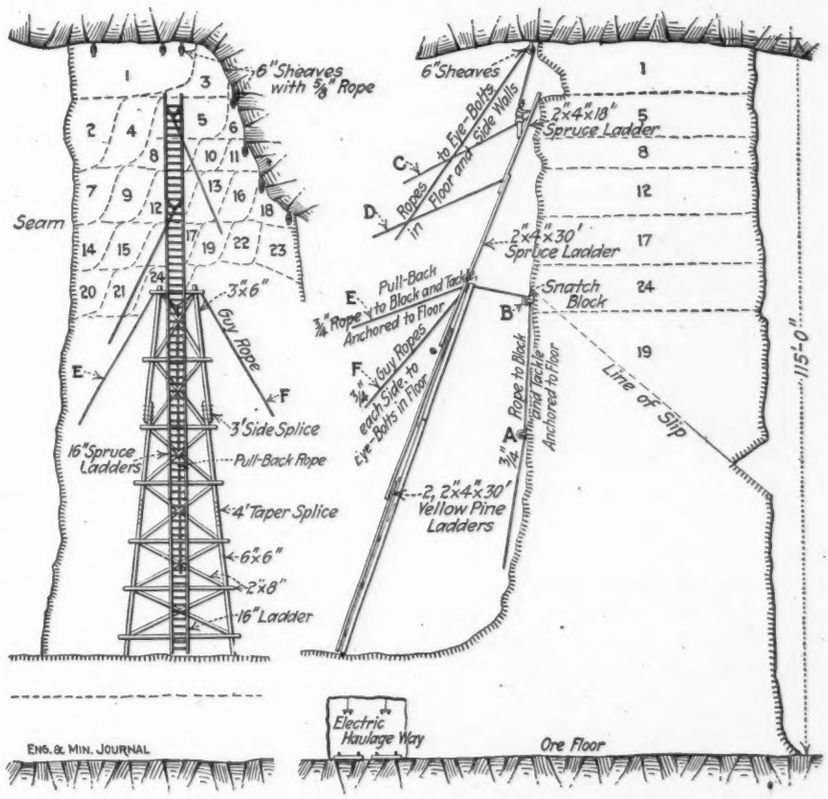
REMOVING A GYRATORY CRUSHER HEAD FROM ITS SPINDLE

The Cleveland-Cliffs Iron Co., in making up a shipment of scrap from the Cliff mine, had occasion to remove some old crusher heads from the spindles, and the operation was carried on in the following manner: The spindle with the head on it was rested in a frame, as shown in the accompanying drawing. A yoke strap, which in this case was a yoke taken from an old Cornish pump, was fitted over the large end of the head and extended a sufficient distance beyond the small end of the head to allow a 15-ton jack screw to be put in between the top of the yoke and the end of the spindle. The blue flame from a kerosene blow torch was played on the head for about 40 min., when one side became heated and the pressure exerted by the jack screw easily removed the head. Railroad iron could be used to form the yoke strap.

Mining a Pillar of Iron Ore

In mining the deposits of magnetite at Mineville, N. Y., the room-and-pillar method is adopted. In an exceptional orebody these pillars may be trimmed down to a floor of over 100 ft. below the back. Often in taking up lower levels, the pillars which are started on the floor above show signs of weakness, due to seams and blocky ground, when rounded on the lower levels. Trimming the pillar or cutting away portions to seams may make the pillar perfectly safe. Again a seam may show which cuts across the entire pillar and at such an angle that blasting near the ground will dislodge portions above the seam.

A particularly seamy pillar in one of the Mineville mines was recently taken down, after it was decided that the danger to the miners working near such a pillar would be much greater than working under the greater hanging-wall span attended by removing the pillar. To mine the pillar, reliable men were selected, A-frame staging and ladders were rigged, and two roofmen (working as machinemen) mined the pillar until the pillar was cut away and lowered below the main slip. The work was supervised by a head roofman. Two miners were kept near the foot of the pillar under cover of the back of the main haulage drift. They hoisted drills, water and tended the guy and pulling-back ropes. The miners on the pillar worked with ropes around their waists. These ropes passed through small sheave wheels held by split and wedge eye-bolts made fast to the hanging wall. Several sheaves, each fitted with a 5/8-in. rope, were hung, and new eye-bolts were fastened to the hanging close to the breast as the cutaway advanced. If any fall from the back should break the staging, the men could have been lowered by the miner at the foot of the pillar, by means of any



METHOD OF MINING A PILLAR OF IRON ORE, MINEVILLE, N. Y.

one of the ropes hanging from the sheaves hooked to the eye-bolt.

The ropes served their purpose, for after one of the first blasts near the hanging wall, the head roofman had climbed the staging to inspect and had started down the back ladder when he heard the back cracking. He climbed back to the small bench, which had just been made by blasting. The fall broke the A-frame and ladders and he was lowered by one of the hanging sheave ropes.

The first drilling on the pillar was done with a block-hole machine; after a small bench had been cut in the pillar near the hanging wall, a 2¾-in. machine was used. Blasting was done by both fuse and battery and holes were pointed in such a manner that little material went in the direction of the staging. Certainly good judgment was exercised by the miners in blasting, for until the pillar was entirely free from the hanging, the roofmen left the complete drilling outfit on top of the pillar during each blast, the machine was never broken and again no part of the staging was broken by blasting, except a few ladder rungs. Before touching the holes, of course, the rigging was pulled back some distance by block and tackle.

A small portion of the pillar came away on the line of the main slip during blasting. This was fortunate, for it made the work much safer. The one block which did slip off weighed approximately 170 tons. The sketch shows approximately the order of blocks removed in freeing the pillar from the back, and also the staging and equipment.

In raising the staging, the following was the procedure. A 30-ft. ladder was raised and an eye-bolt fixed at *A;* 6x6-in. stringers, spliced by 2x8-in. plank, were then raised by block and tackle hung to the eye-bolt. Spliced spruce ladders were then raised on the staging to a point *B,* where another eye-bolt was driven. By means of this and block and tackle, 3x6-in. sticks were then raised, spliced to 6x6-in. stringers, and then strutted with 2x8-in. plank. From here on, ladders were spliced to the bottom length of ladders, and the line was drawn up to the top of the pillar by block and tackle hitched to the 2x8-in. braces, the ladders being guyed by ropes *C* and *D,* and the staging guyed by ropes *E* and *F.*

Compressed Air Storage in Rock

By Frank Richards*

One of the most familiar annoyances or inconveniences in the use of compressed air is insufficiency of storage capacity. In most of the employments of compressed air, especially in mining operations, the air is used intermittently and the rate of air consumption varies over a wide range. At the same time the usual air receiver is so small as to have little effect in maintaining constant pressure.

It has often been proposed and also many times attempted to use old and abandoned workings of mines for air-storage purposes, but in many cases complete failure has resulted on account of the impossibility of making the rock air-tight. It is, therefore, a pleasure to call attention to at least one instance where this scheme has worked successfully. The storage capacity in this case is a hundred times that of the largest commercial air receiver usually furnished.

Fig. 1 shows the essential features of a crosscut and drift on the 700-ft. level of the Center Star mine of the Consolidated Mining & Smelting Co., of Canada, Ltd., Rossland, B. C., which has been fitted up to serve as an underground receiver. In this case the rock was so close grained and free from fissures that the leakage was inappreciable. Fig. 2 is a plan of the workings appropriated for the receiver, the dam being placed as indicated. At this point the rock was notched out so as to give a bearing at least two feet wide all around to take the thrust caused by the air pressure, which aggregated about 450 tons. The dam was made of concrete eight feet thick, reinforced as seen in Fig. 1, by nine horizontal arched rows of 30-lb. rails. A manhole, 14x18 in., was run through the middle of the dam and secured by a cover on the inner face.

Inside the dam, with a space of 35 ft. between, was erected a concrete wall 12 in. thick to form a water chamber between it and the dam. It will be observed that this wall had to resist only the water pressure of four or five pounds at the most, the air pressure being effective equally on both sides, communication being free over the top of the wall.

The air communication between the main air line and the storage chamber was through the 6-in. pipe, this passing through the water chamber on the way. Any water which might accumulate in the bottom of the storage chamber could be drawn off through the 4-in. blowoff, while the 2-in. pipe would discharge the water from the water chamber when required. The function of the 1-in. pipe is not clear, but it could be used, like a try-cock on a steam boiler, to show whether or not the water was up to the turned-up head of the pipe.

How the water chamber was kept filled does not appear, but a pump must have been required for the purpose. It does not appear in fact how much the water scheme was used, Fig. 1 being from a blueprint made before the storage system was put into use. The air, so far as the storage function was concerned, was entirely independent of the water and we know that the storage is a permanent success. All necessary valves and gages were, of course, provided outside to keep the engineers fully informed and in full control. For the information embodied in this article I am indebted to George A. Ohren, of the Canadian-Ingersoll-Rand Co., Vancouver, British Columbia.

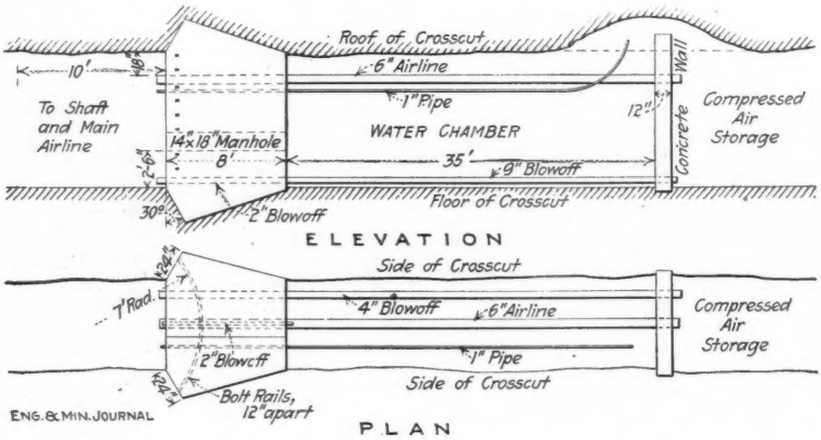


FIG. 1

FIG. 2

COMPRESSED AIR STORAGE IN ABANDONED DRIFT

*Ingersoll-Rand Co., 111 Broadway, New York.

Improvised Method of Sharpening Steel

By G. L. Sheldon*

It is frequently necessary to work at a prospect or mine where there is no bellows or blower available for sharpening the steel. To overcome this difficulty, find or make a 3-ft. perpendicular bank in some gulch or creek bottom, preferably in heavy soil. At the base, dig a small cave or hole in the bank large enough in which to place the fire. On top of the bank, back a foot or more from the face, work out a flue or chimney hole several inches in diameter with a piece of steel and connect the hole with the back part of the fireplace below. Outside, in the face of the bank, and about half way up, make two small horizontal holes, a few inches apart and about the size of the steel, connecting with the flue or chimney.

Place the steel to be sharpened in these holes, so that the points will be in the center of the chimney. Take some dry wood (pitch or pine knots are best) make a good blazing fire, so that the flame will draw out at the top of the chimney, and the steel will become red hot in a short time.

It may be necessary, at the start, to use a wide-brimmed hat as a blower to get the blaze started up the chimney. If the sharpening is done in the evening and the improvised forge is situated in a gulch or creek bottom, a small dirt wing on the lower side of the firebox to catch the draft, which is always down the gulch in the evening, will serve to drive the draft up the chimney. For an anvil, cut down a near-by tree at about the right height on which to work, and if nothing else is available, an 8-lb. hammer sunk into the top of the stump will answer the purpose. An old worn-out stamp-mill die, an inch or more thick, sunk into the top of the stump makes an anvil good enough for months of work. It is light and easily packed.

*Box 135, Ely, Nev.

Turn Sheave Location and Support

By C. R. Forbes*

It occasionally happens at a mine that it is necessary to deflect the hoisting rope running from the head sheave to the hoisting engine, by means of a turn sheave, because a suitable situation for the hoisting engine cannot be obtained in a direct line from the shaft, or in other cases because of a centralized power plant, two hoists may be placed in one engine house, which may be out of line with one or both of the shafts.

The accompanying photographs show a rather unusual method of supporting such a sheave at a Lake Superior copper mine. In this case the turn sheave was necessary because a suitable place for the hoisting engine could not be obtained in the line of the shaft, at a sufficient distance from the head sheave to permit the rope to wind properly on the drum of 11-ft. face; a minimum distance of 400 ft. was required and at that distance there was situated an office building and boarding house, and also the character of the ground at this point was not suitable for constructing a hoisting-engine foundation at a reasonable cost. However, at a point to the east of the shaft, a sufficient distance away, there was an outcrop of trap rock which made an ideal place for the foundation, but which necessitated the use of a turn sheave shown in the illustrations.

The method of supporting this sheave was somewhat out of the ordinary, as the top of the concrete base was made parallel to the plane of the sheave instead of horizontal, as is the more common practice. The timbers supporting the sheave are 14 in. square and are held in place by 1½-in. bolts set in the concrete.

In constructing a foundation of this kind, the most difficult part is in locating and erecting the form for the odd-shaped concrete base. The operation in this case was accomplished as follows. A rectangular frame, as shown on p. 882, was constructed of 2x4's, the frame being made the same size as the top of the concrete base.

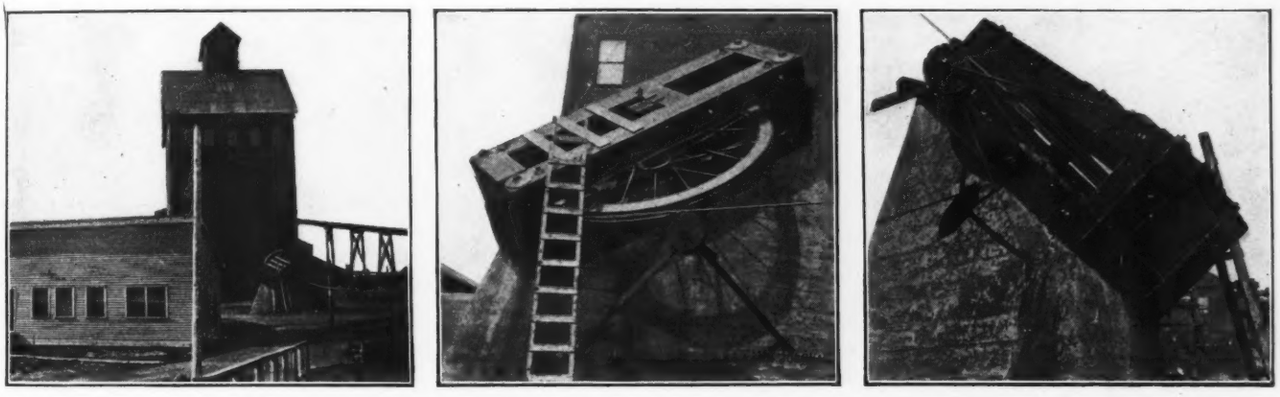
Projecting up from this frame, perpendicular to it, were three upright pieces as shown; the length of these pieces was the same as the distance from the center of sheave to top of concrete, which was determined by the size of timbers, the length of hub and shaft of sheave, etc. It was necessary to use these projecting pieces to line in the frame with, as all calculations were made with respect to the plane of the sheave itself and not the top of the concrete.

From a survey, the horizontal angle between the ropes was determined and also the slope of the rope in each direction; and by various calculations, the direction, length and slope of the line from the point of intersection of the ropes to the center of the sheave, were obtained. To locate the frame, the transit was set up in the determined line, and the frame lined in by sighting along the tops of the uprights; by measuring to a plumb line suspended from the top of the middle upright, it was centered correctly and placed at the proper height. The slope in both directions had been calculated, and by the use of two-degree levels set at the proper angles and placed on the frame, it was possible to set it at the correct slope, where it was braced and held firmly in position. The form was then built around it with a batter of 1:4, and the bolts set in position and held by a template until the work of filling in with concrete was completed.

It is possible to locate a sheave of this kind without the use of a transit by simply stretching chalk lines from the point of intersection toward the head sheave and engine drum and lining in the sheave by eye, although this method would not be as accurate as the one described and would take more time on the part of the workmen.

The solution of the turn-sheave prob-

*Professor of mining, University of Missouri, Rolla, Mo.



Turn Sheave Erected on an Oblique Support at a Michigan Copper Mine

lem, although tedious, is comparatively simple and may be accomplished in several ways, probably the easiest of which, and one that involves the use of plane trigonometry only, is shown below. From the survey, the horizontal angle *C' A B'* between lines of rope is found to be 106°; slope of rope from point of intersection to head sheave, 46°; slope of rope from point of intersection to engine drum, 10°. Diameter of turn sheave 11 ft. Referring to the diagram, it is readily seen how the true angle between the ropes, the angle *CAB*, can be determined. This angle is found to be 93° 32′, and the line from the point of intersection *A*, to the center of sheave, will bisect this angle, but it must be remembered that the projection of this line on the horizontal plane, the line *AO'* in figure, will not bisect the angle *C'AB'*, and further calculations must be made to determine the horizontal angle *O'AG'*. It is next necessary to determine the length and slope of the line *AO;* with

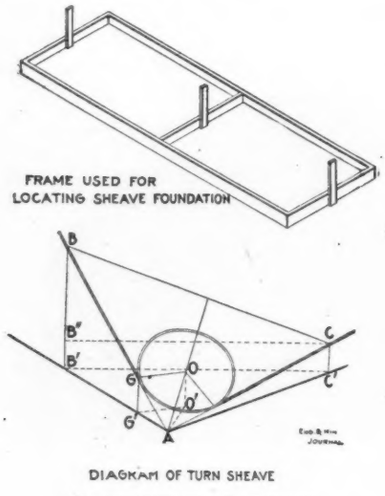


DIAGRAM OF TURN SHEAVE

TURN SHEAVE LOCATION

the data given in the problem this length is found to be 7.55 ft. and the slope 40° 41′. In order to find the angle *O'AG'*, draw *OG*, a horizontal line in the plane of the sheave. The length of this line can be determined, and as it is equal to *O'G'*, it can be used in solving the triangle *O'AG'*, of which three sides will be known; this angle is found to be 65° 49′.

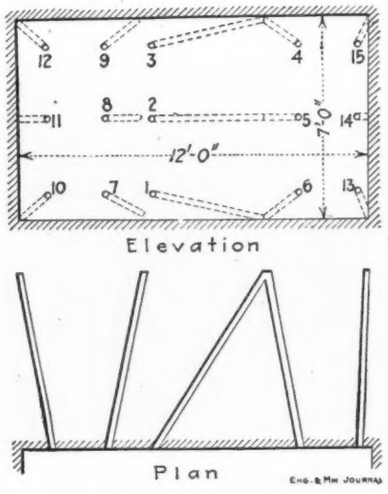
DATA REQUIRED FOR LOCATION

The data necessary for locating the sheave then are: Horizontal angle to be turned at point of intersection from line of rope to head sheave, 65° 49′; horizontal distance from point of intersection to center of turn sheave, 5.72 ft.; vertical distance from point of intersection to center of turn sheave, 4.92 ft.; slope of line from point of intersection to center of turn sheave, 40° 41′; slope of line at right angle to previous line (*CB* in figure), 22 degrees.

Rapid Driving at the St. Joseph Lead Mines

The St. Joseph Lead Co. has just completed a drift connecting its No. 1 and No. 7 mines at Bonne Terre, Mo. This drift was 7 ft. high by 12 ft. wide in hard unstratified limestone. A record of 455 ft. was made in 25 working days of three shifts each, or 75 eight-hour shifts. The working force consisted of three machine men, three chuck tenders, two muckers and one mule driver for each shift.

Three Sullivan 2¾-in. piston drills were furnished with air at 90-lb. pressure. The drilling was done from a crossbar to which were attached three arms designed by Assistant Superintendent Monie, similar to those used on columns. This enabled the miners to work the machines one above the other when necessary, and if one side of the drift was harder than the other, one of the machines could be moved over to the hard side so as to drill



ST. JOSEPH DRIFT ROUND

in any position desired, without interfering with operation of either of the others.

To pull a 6-ft. cut 15 holes were necessary, placed as shown in the sketch. The cut holes were drilled to meet at the points. A vertical row of three relief holes widened out the cut and the six side holes finished squaring the face. When the ground was harder than usual, eight, instead of six cut holes were used.

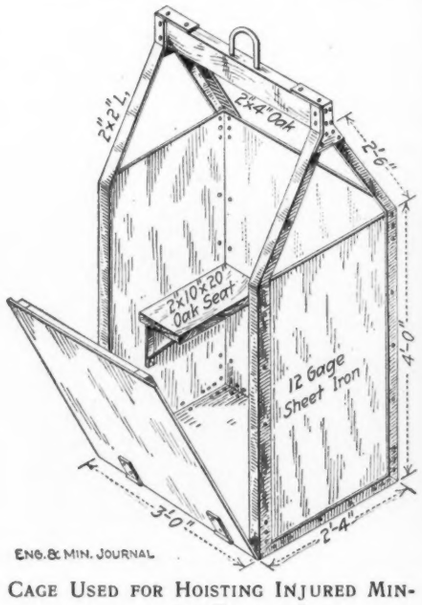
Each of the cut holes, 1, 2, 3, 4, 5 and 6 was charged with six to eight 1½x8-in. cartridges of Forcite 60% gelatin dynamite. Each of the remaining holes received 3, 4 or 5 cartridges of the same explosive, according to the character of the rock encountered, making 80 to 90 cartridges, 62 to 72 lb., for the entire round. This gives an average of 11.2 lb. of explosive per foot, or 1.44 lb. per ton of rock.

The blasting was all done by electricity. Victor electric fuses were used. The No. 5 were first used, but after a trial of the No. 8, these were used exclusively on account of the better work done by the explosive and an improvement in the fumes after blasting. The blasting machines used were the Reliable No. 3 and No. 4. The lead wire was 500 ft. of Duplex No. 14 B. & S. gage. The blasting was done from small chambers cut in the side of drift. The drilling, including setting up and tearing down, took six hours. The blasting occupied about 1½ hours.

Hospital Cage

BY L. D. DAVENPORT*

If a miner working on one of the sublevels in the Chisholm district, Minnesota, is injured it is usually easier to hoist him up one of the timber shafts than to take him to the bottom level and hoist



CAGE USED FOR HOISTING INJURED MINERS THROUGH TIMBER SHAFT

him up in the skip. At one time it was customary to use the powder cage for this purpose but the latter was so small and inconvenient that a special type of apparatus was designed for this purpose.

The hospital cage as shown in the accompanying sketch is of sufficient height so that an injured man can stand or be supported in an upright position if desired. The large door in the front, which is reinforced with oak cleats, can be swung down to the ground making it easy to place an injured man in the cage. There is a seat on one side and the cage is made large enough to accommodate two men in case it is necessary to have the injured man accompanied by someone. The cage is light and strong and was designed and built under the direction of the master carpenter at the Monroe mine.

*Engineer, Oliver Iron Mining Co., Mesaba, Minn.

Details of Metallurgical Practice

Records of Experience in Ore Dressing, Cyaniding and Smelting

Crushing with Holman Stamps

The practice at the Mountain Queen mine, near Southern Cross, Western Australia, in crushing the ore, which consists of soft oxidized material and hard surface ironstone, is described in the *Monthly Journal* of the Chamber of Mines, Aug. 31, 1912. The ore from the mine is dumped on a flat grizzly over the battery bin. Over-size lumps are broken by hand on the grizzly to pass the 2¼-in. openings.

The ore is then fed to a Holman pneumatic-stamp battery, comprising two mortar boxes, each equipped with three 12-mesh screens. Crushing is done in salt water, an average ratio of six of water to one of ore being maintained. The stamps are followed by 5-ft. grinding pans, fitted with Freeman pipe classifiers, which reduce the ore to the necessary fineness for amalgamation and subsequent cyanide treatment. The action of the Holman stamps is as follows: In the walls of the pneumatic cylinder are four rows of holes, two above and two below the center position of the cylinder. Rows two and four are plugged. As the cylinder travels up and down, it traps the air between the piston and the cylinder covers and the air thus compressed acts as a cushion, which, on the return stroke, assists in the propulsion of the stem. As the shoes and dies wear, the holes in rows two and four come into use, the other two rows being plugged.

From 15 to 17 hp. is consumed per head of stamp, falling at the rate of 123 drops per minute, the double unit calling for 30 to 34 hp. This speed is maintained as long as the ore is soft. On hard ore the stamps were run at 135 drops per minute, each head consuming from 22 to 25 hp. In both cases 130 tons of ore were crushed per day. In seven months 24,892 tons of ore were crushed, the consumption of metal in shoes and dies being 11,114 lb., or 0.447 lb. per ton of ore.

Desloge Picking Shaker

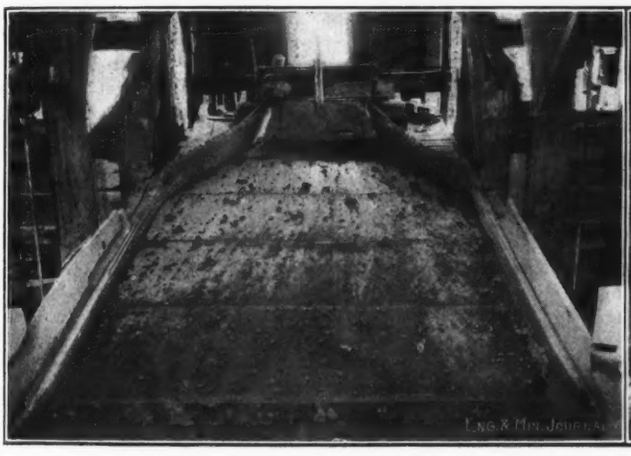
At the different shafts of the Desloge Consolidated Lead Co. in southeastern Missouri, the ore, after passing over a grizzly, to get rid of the undersize, falls on a large shaking apron, called the shaker or picker. Here several men with sledge hammers break the large boulders so that they will go into the crushers easily, and also determine whether the boulders are ore or waste. Owing to the muddy condition of the rock it is difficult to tell whether it is ore or waste until broken. It is thought better to do this sorting at the surface, where the men have better light and the sorted waste is at hand for easy inspection and sampling, than to sort underground where the work would be more scattered and where a large part of the fines from the sledging would be lost on the floor of the workings. The ore is a mineralization of a fairly well bedded dolomite and it breaks readily.

The shakers are 10 ft. wide and from 22 to 29 ft. long. A heavy load accumulates on them when the ore is being hoisted fast; occasionally as much as 15 tons of ore are on the shaker decks at one time. The ore is fed along by means of a shake given by a simple eccentric drive. A differential stroke was tried but this was found to throw considerable strain on the drive wheel of the eccentric shaft. The stroke of the driving eccentrics is about 4½ in. The shakers are given a slope of from ¾ to 1 in. per foot of length; this aids in carrying along the ore. The speed of discharge is regulated mainly by the speed at which the table is moved back and forth. With the shorter shakers a speed of 78 r.p.m. is used on the eccentric shaft, while with the longer ones the speed is 89 revolutions per minute.

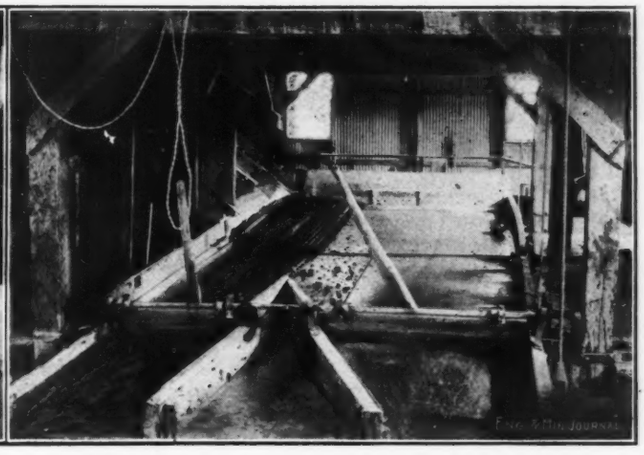
The deck is made up of 2-in. planks laid longitudinally on cross pieces of 6x8-in. timber. A covering of ⅜-in. plate is fastened down on top of the deck. This plate lasts about a year as the places subject to excessive wear are protected by a covering of rails.

The shaker at the No. 3 shaft is suspended from overhead beams by means of old hoisting cables, about 5 ft. apart, which are fastened by shackles and clevises to eye-bolts in the cross timbers and the carrying beams. Rods were tried instead of the cables but were found to be too rigid. The driving shaft, 3½ in. in diameter, carries the two eccentrics which operate the shaker through simple connecting rods. The eccentrics are about 3 in. wide; the outer strap or yoke has an outside diameter of 15 in., and an inside diameter of 10½ inches.

In order to absorb the shock that would otherwise be transmitted directly to the driving belt when a car is dumped on the shaker, the picker should be driven by a heavy, webbed driving pul-



PICKING SHAKER, END FEED. DESLOGE NO. 4 SHAFT



PICKING SHAKER, SIDE FEED. DESLOGE NO. 3 SHAFT

ley that will also act as a flywheel. The webbed driving pulley used on the 10x 29-ft. shaker at No. 3 Desloge shaft has a diameter of 5 ft. and a face width of 10 in. The web between the four spokes is 3 in. thick; the rim 1⅝ in. thick and the spokes which come out to the full width of the face are 2 in. thick. Those spokes, however, that serve as the splice faces for the two parts of this split drive wheel, are 3 in. thick when bolted together.

The shaker feeds the ore to one or two breakers. Brennan multiple-jaw breakers as well as Farrell-Blake crushers are used. The Brennan breakers have been in use for years and are popular because of the light weight of the different parts which allows repairs to be made more easily.

While the shaker can be fed from the side, it is preferable to dump the ore on it from the end as it is then spread evenly across the deck, making it easier to sort out waste; the initial velocity of the falling ore also sends it ahead in the direction of the feed of the shaker. At the end of the deck are plank chutes for guiding the ore to the mouth or mouths of the crushing equipment. A gate is provided for shutting off the feed to the crushers and when the crusher is heavily loaded, this gate which slants forward toward the head end of the shaker, can be used as a skimmer to regulate the amount of ore being fed to the crushers. Of course such a shaker would be convenient only where there is coarse sorting and sledging to be done. It takes about six horsepower to run the smaller size of Desloge shaker.

Printing Titles on Tracing

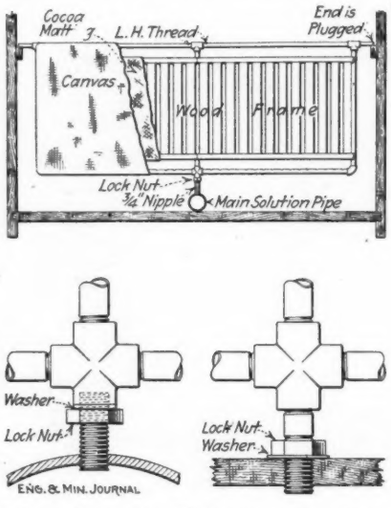
In getting out the enormous number of detail drawings required by the Board of Water Supply, City of New York, it was soon found that to letter all the titles by hand required a large expenditure of draftsmen's time. In a paper read by C. F. Bell at a meeting of the Municipal Engineers of the City of New York is found the following description of the method used in printing standard titles on drawings and tracings:

In printing the titles by the press, the drawing is laid on a rigid horizontal pad, around which a table has been built large enough to allow drawings to be laid out flat without danger of creasing, and the chase in which the type has been set is brought down on this. For a long time a sprinkling of either pounce or magnesia was applied immediately after the printing to hasten the setting of the ink, but both of these got on the men's clothing and gave the work a grayish appearance, while the titles never became either elbow or benzine proof, and it often happened that after much handling, the titles would have to be retouched and sometimes altogether renewed by hand. At one time we tried putting a thin coating of collodion over the titles instead of using pounce, but the resulting gloss prevented good photographic work, while the collodion soon lost some of its transparency and looked dirty. Then we tried using "Fixatif," a liquid used by artists for setting charcoal sketches, and we are still using it with most satisfactory results. A template, made by cutting out the paper proof submitted by the printer, is placed over the title and a light coating of "Fixatif" is sprayed over the printing from an atomizer, no pounce being used. This coating is almost invisible, preserves the black appearance of the ink, which is of great advantage in photographing, and in a few hours (over night) the printed work is finger-proof and practically benzine-proof.

Clarifying Cyanide Solutions

By F. H. Wetherald*

Methods of clarifying solutions previous to precipitation vary in cyanide practice. Frequently they are inefficient when an excessive flow of slimy solution to the gold tanks occurs at times. Often apparently clear solutions carry fine colloidal material and complex metallic compounds to the zinc boxes, where the effect on precipitation is notably injurious.



Filter Leaf for Clarifying Solutions

Vertical gravity filters which I installed in two mills so satisfactorily solved the problem of obtaining clear solutions, that a description of this filtering arrangement may prove of interest.

The filters were devised by W. E. Holderman, in connection with the Holderman process, at Manning, Utah. They consist of canvas-covered frames placed vertically in the gold tanks at intervals of about one foot. Each filter has a bottom connection with a common discharge pipe placed on the bottom of the tank, and since it is subject to a steady gravity pressure only, much less substantial construction is required than for vacuum filters.

The vertical position not only increases the possible filtering area, as compared with a bottom filter, but also allows much of the suspended material to settle between the filters to the bottom of the tank away from the filter surface.

Wooden frames, with 1-in. space strips, inclosed in a canvas envelope, give good service, but for deep tanks or where solutions are persistently clouded, requiring frequent cleaning of the canvas, a more substantial construction is advisable.

In round tanks the filters may correspond in length to the respective chords of the circle, or be built to the length of an inscribed rectangle. The pipe or box conveying filtered solution from the tank is then placed centrally.

A strong frame is made by using ¾-in. pipe, arranged as shown in the accompanying illustration. The two horizontal pipes forming the top member of the frame have a T-joint connection with the central vertical stiffening pipe. These horizontal pipes are cut with right- and left-hand threads in order to draw the frame tightly together. The two horizontal pipes forming the bottom member and the lower end of the vertical center pipe are screwed into a cross joint, the fourth or bottom opening of which is stripped of threads to receive loosely the nipple tapped into the main solution pipe. This nipple is provided with a lock nut and washer to insure a tight joint. Where a wooden box is used to convey filtered solution from the tank, the nipple is screwed into the cross, the box receiving the nipple and seating the washer. In the bottom pipe ⅛-in. holes are drilled to provide means of exit for the solution. The inner wooden space frame is covered with cocoa matting and the complete frame inclosed in the canvas envelope, which is rolled and sewed at the top and about the protruding end of the cross.

At one plant, the canvas at the end of two weeks was covered with very light colloidal slime ⅛ in. thick, although the solutions had always appeared clear. The filters were cleaned as follows: Solution in one of the two tanks was drawn off to a point one-third of the height of the filter, and the canvas scrubbed in the remaining solution with a long-handled brush. The muddy solution was then allowed to settle one hour, and the tank again placed in commission. The total time required for the operation was three hours. The accumulated slime was sluiced out of the tank twice a year.

In another case the tank was drained once a week, and the filter leaves cleaned by sluicing with a small high-pressure stream, the slime being pumped to a thickener. For shallow tanks 8-oz. canvas is satisfactory. The accompanying illustration shows a filter leaf installation and discharge pipe connections for either a pipe or a wooden box.

*Metallurgist, Virginia City, Mont.

The Cost of Doing Things

Data from Mining and Metallurgical Practice

Mount Morgan Operations

According to figures given in the report of the Mount Morgan Gold Mining Co., Mt. Morgan, Australia, for the year ended May 31, 1912, the total dividends paid since the formation of the company, in July, 1886, to date are equal to approximately 44% of the total proceeds. Expenditures on plant and machinery account are equal to about 4.56% of the total proceeds from metal, while depreciation charged against this account amounts to 1.44%; wages and contracts have constituted almost 29% of the total proceeds. For the year materials handled consisted of 166,499 tons of auriferous copper ores, etc., 91,946 tons of Many Peaks ore, 93,413 tons of siliceous sulphide ore, 64,056 tons of limestone flux, 367 tons of ironstone flux, 222,446 tons of waste from open cuts, and 8752 tons of waste rejected underground, a total of 647,488 tons of material handled. About 8.5 tons of overburden or waste was removed in the open cuts for every ton of ore secured, while about 3.7% of the tonnage mined underground was rejected as waste. To produce one ton of blister copper in the reduction works during the year ended May 31, 1912, it required 25.27 tons of Mount Morgan ore, yielding 2.71% copper; 13.95 tons of Many Peaks ore, yielding 2.25% copper; 9.72 tons of limestone flux; 0.05 tons of ironstone flux; 1.88 tons of converter lining and 4.39 tons of coke. During year ended May 31, 1911, it required 26.18 tons of Mount Morgan ore, yielding 3.01% copper; 8.15 tons of Many Peaks ore, yielding 2.26% copper; 12.56 tons of limestone flux; 2.45 tons of ironstone flux; 1.58 tons of converter lining and 4.52 tons of coke to produce one ton of blister copper.

Some South African Costs

During the year 1911-1912, the New Modderfontein mine milled 585,500 tons, valued at 34s. 6d. at a working cost of 18s. 8d. for a working profit of 15s. 10d. per ton, or a total of £478,862; £350,000 was declared in dividends. The total ore reserves and pillars total 4,067,000 tons, assaying 8 dwt., with 723,000 tons of estimated 3 to 4 dwt. content. The famous circular shaft was sunk 1167 ft. during the year on an average rate of under 100 ft. per month. The average stope width was 57 in. Mining costs were: Stoping, 3s. 7d.; timbering and rock walling, 7d.; shoveling and tramming, 3s. 4d.; pumping, winding, etc., 2s. 8d.; development, 1s. 5d.; total, 11s. 7d. per ton. Cyanide pulp assayed 8s. 11d. per ton and residues 9d. per ton.

The Simmer & Jack mine during the year ended July 31, 1912, made a working profit of £529,944. The 320 stamps and seven tubes milled 863,500 tons of the 922,624 tons mined, 528,828 tons came from stopes and 393,796 tons from foot and hanging wall and pillars in old workings. Costs were: Mining, 7s. 0.794d.; development, 3.438d.; surface transport, sorting and crushing, 4.852d.; stamp milling, 11.414d.; tube milling, 7.422d.; sand treatment, 11.712d.; slime treatment, 5.796d.; general, 1s. 0.158d.; maintenance, 0.576d.; total, 11s. 10d. per ton.

On the Sub Nigel mine during the year, 30 to 35% of the ore mined was sorted out. On a stoping width averaging 39.98 in., hammer boys broke 0.082 fathoms per shift; small machines, 0.669 fathoms; large machines, 0.776 fathoms.

Milling at Esperanza

A detailed statement of consumption of mill supplies at the Esperanza Mining Co., El Oro, Mexico, for 1911 shows that 246,968 wet metric tons were cyanided at an average consumption of 0.5 kg. of sodium cyanide (120% KCN) per ton of ore. The lowest consumption, 0.356 kg. occurred in March and the highest in June, when it reached 0.59 kg. per ton. The consumption of zinc dust (93% metallic zinc) used in precipitation ranged from 0.279 to 0.484 kg. per ton of ore, or an average of 0.417 kg. for the year. The average consumption of lime, which contained about 75% CaO, was 6.433 kg. per ton of ore and ranged from 2.714 to 10.676 kg. during the year. Lead acetate was used at the rate of 0.140 kg. per ton of ore and varied from 0.07 to 0.195 kg. Water consumption ranged from 3.370 to 6.421 tons per ton of ore and averaged 4.399 tons for the 12 months.

At the stamp battery 475 new shoes and 604 dies were used. The lowest number of shoes placed was two in July and the highest was 61 in February. The average consumption of shoes equaled 0.177 kg. per ton of ore. The placing of dies per month ranged from 11 to 109 and the consumption averaged 0.132 kg. per ton of ore. In the tube mills a 30% grade of steel liner was used, the consumption being at the rate of 0.768 kg. per ton of ore; quartz pebbles at the rate of 39.989 kg. On the slime filter presses a No. 2 grade of canvas was used and the replacements during the year show an average consumption of 0.02 sq.yd. per ton of ore. Hydrochloric acid consumption, 35% strength, used in cleaning canvas filters equaled 0.08½ kg. per ton of ore. In melting precipitates the average consumption of supplies figured on the basis of one kilogram of bullion produced was as follows: Gas oil, 4.476 kg.; borax, 0.957 kg.; soda, 0.505 kg. The consumption on the basis of one metric ton of ore was: Gas oil, 0.312 kg.; borax, 0.067 kg.; and soda, 0.035 kg. A total of 289 crucibles consisting of 211 Dixon and 78 No. 60 was consumed, or an average of 24.08 per month. It required an average of 66.27 horsepower-hours per ton of ore in milling.

Mining Marquette Ores

The following figures give the average cost of mining and delivering iron ore from the Marquette range to lower lake ports during a five-year period, 1906-1910 inclusive. Dr. C. K. Leith describes the hard-ore group of mines as follows: "The ores at the top of the Negaunee formation just below the Goodrich quartzite are throughout the district hard hematites, locally more or less specular and magnetic. In certain mines the basal conglomerate of the Upper Huronian which rests against these ores is also sufficiently rich to be mined and constitutes a part of the orebodies. The orebodies are tabular in shape parallel to the steep-dipping contact of the Negaunee and Goodrich quartzite, though locally folded and faulted. Soft hematite is locally found in these mines in the jasper foot wall. The average depth of the producing mines not weighted acording to tonnage is 1041 ft. These ores have been mined to a depth of 1984 ft. at the Champion and this group as a whole constitutes the deepest of the Marquette mines."

The principal mines in the hard-ore group are: Republic, about 1900 ft. deep; Washington and Barron worked spasmodically for 40 years; American, Volunteer; Lake Superior Hard Ore, operated by the Oliver Iron Mining Co. and estimated by Mr. Finlay to have 2,270,000 tons in reserve; Section 16 of the Oliver

company; Champion, Cliff Shaft and North Lake No. 2 orebody. The total valuation of the group as estimated by Mr. Finlay was $12,132,000 on a total expected tonnage of 21,667,000 tons. A summary of the records of the hard-ore mines of the district for the period mentioned shows that the value of the ore shipped was $17,015,407 of which $262,329 was paid in royalties to fee owners. The total net profit of the profitable mines was $4,723,752 and the loss to unprofitable mines $572,825 which includes some developing properties. Basing the average value of the ore at 100% the costs were: Mining, 39.5%; exploration and development, 2.4%; construction, shafts, machinery, etc., 4.4%; general expenses including administration, 3.3% royalties, 1.5%; taxes, 2.8%; rail freight 8:9%; lake freight, 13.4%; commissions, 0.3%; total of 76.5%, indicating that the average profit is about 23.5% of the average value of the ore.

Dr. Leith describes the soft-ore group in part as follows: "The orebodies are located with the Negaunee formation in its middle and lower horizons and show great variety of shapes. In the Negaunee basin it is a greatly folded and faulted sheet with comparatively low pitch to the south of west." In some mines the tabular development is less marked the orebodies occurring in more or less channel-like lenses in the jasper with relatively low pitch with great irregularity and cut by dikes. In drilling the ore has been cut to a maximum depth of 2375 feet. The principal soft-ore mines and properties are: Lillie, Cambria and Hartford controlled by the Republic Iron & Steel Co.; Jackson of the Cleveland-Cliffs company; Mary Charlotte, Breitung-Hematite, Lake Angeline, Mitchell, Rolling Mill, Lake, Negaunee, Salisbury, Maas, Lake Superior soft-ore mines of the Oliver company, Queen, Race Course, Lucky Star and Harvey Lots.

The total value of the properties as estimated by Mr. Finlay was $27,825,000 based on a yearly production of 2,263,000 tons and an expected tonnage of 53,145,651 tons. During the period mentioned the profitable mines earned $12,467,025; while the unprofitable mines lost $255,584. Royalties paid by the operating companies to the fee owners amounted to $1,859,944. The average cost of producing the soft ore including delivery to lower lake ports was as follows, basing the value of the ore a 100%: Mining, 36.4%; exploration and development, 2.1%; construction, shafts, machinery, etc., 3.2%; general expenses including administration, etc., 3.3%; royalties, 4.5%; taxes, 2.1%; rail freight, 8.3%; lake freight, 16.8%; commissions, 0.3%; a total of 77%, indicating an average profit of 23% of the average value of the ore delivered at Cleveland.

Leveling Dredged Ground

An electric winch from a dismantled dredge, in the Oroville district, operating a drag scraper, has made possible cheap leveling of dredged areas. The work, as described by James C. Bennett (*Engineering News*, Oct. 17, 1912), involved leveling a dredged tract to a grade suitable for building lots, making a roadway 60 ft. wide by 600 ft. long, half the width being a cut and the remainder a fill, and filling a large water hole to a grade above the level of standing water. Practically all previous work had been done by owners on force account, and, since the only object to be gained was to level the ground to any convenient grade, no attempt had been made to determine the yardage involved, hence no unit cost was available. The nearest approach was based on the cost per acre, which ranged from $175 to $200 per acre. In this, however, it was impossible to secure any suggestion even as to the approximate yardage represented.

LEVELING COSTS AND DATA

Daily Expenses		
1 Winchman	$5.00	
2 Helpers @ $2.50	5.00	
1 horse (for moving lines, etc)	1.00	
133.33 kw-hr. @ 2½c	3.00	
Total daily cost of		$14.00
Time required		
Days actually scraping	62	
Days moving lines and winch and making repairs	10	
Total days worked		72
Working days in which no work was done	10	
Total time, working days		82
Average length of haul		175 ft.
Average day's duty		247 cu.yd.
Largest day's duty		425 cu.yd.
Average hourly duty		32.2 cu.yd.
Costs		
72 days @ $14.00	$1008.00	
Repairs, materials only	35.00	
4-horse team, man and scraper, surfacing street grade, 1 day	10.00	
600 ft. second hand, 1¼-in. hauling line	54.00	
600 ft. second hand, ¾-in. back line	30.00	
Depreciation at 10%	120.00	
Total cost		$1257.00

In preparation for the proposed work, an attempt was made to determine the approximate yardage involved by a rough measurement, but without success. Some idea may be gained of the difficulties of making measurements on ground of this character from the statement that, for purposes of railroad construction in this field, it was found necessary to make cross-sections at 10-ft. intervals. An estimate based on previous acreage costs would be unreliable in this instance, owing to the necessity of working to grade. Mr. Bennett and the contractors made a joint estimate of the time required to do the work. As the approximate daily expense was known within fairly narrow limits, this afforded the most equitable basis of cost.

Seventy-five working days was agreed upon as sufficient time to complete the work. This was to include lost time on account of repairs, setting deadmen, moving lines and blocks, and moving machine from one position to another.

The data regarding the operation, given in the accompanying table, was compiled during and upon the completion of the work. As will be noticed, a charge is made against the job for the full cost of the ropes. In doing this, the job is being charged with a little more than is really legitimate, as the same ropes are good for probably two to three thousand yards additional. Also, the depreciation charge is probably liberal, as there is little severe wear and tear on anything but the scraper.

A close tally was kept of the number of trips made, or loads hauled, and, from time to time, the loads were measured. An average of 1¼ cu.yd. per trip is believed to be nearly correct. The total amount of material moved, based on the number of trips made, was 15,300 cu.yd. The actual cost per cubic yard was thus 8.2c. For the 62 days of actual scraping, the average running time was seven hours per day.

Cost of Heating Mills

SPECIAL CORRESPONDENCE

A practical detail of some importance, which seems to have received little attention in general, is the heating of mills. This is particularly of great importance in cold countries and in sections where the cold season is of long duration.

In conversation with some operators at Cobalt and Porcupine, the opinion was expressed that some of the poorly constructed mills there incur a cost as high as 50c. per ton of ore for heating during the cold season. Well built mills do not incur such a high cost, but in any case the expense is too great to be ignored. In the mill of the Timiskaming Mining Co. Ltd., which is a small and well constructed building, the report for 1911 records a cost for the whole year of 13.5c. per ton of ore milled for heating. Calculating this for the actual time during which the heating was done, the cost must have amounted to about 27c. per ton of ore milled during the season when heating had to be done. In view of this important fact, it would seem to be good practice to build with the heating necessities in view and look far enough ahead to reduce heating costs to the lowest practicable point.

The annual report of the Minister of Mines of British Columbia shows that taking the province as a whole there were 546 tons of ore mined per year for each man employed about the mines. In this respect, however, the districts vary materially as follows: Slocan District, 113 tons; Nelson District, 130 tons; Trail District, 372 tons; and in the Boundary District 1201 tons were mined per man employed.

Mining Methods at Kimberley—I

By John T. Fuller *

The diamond-bearing rock is mined from craters or "pipes" of volcanic origin. Open-pit mining is used to depths of 300 to 500 ft. Vertical shafts are then sunk in rim rock and adits driven to intersect the craters. De Beers system of shrinkage stopes described.

*Consulting engineer, Honesdale, Penn.; formerly manager of the Dutoitspan diamond mine.

A diamond mine if it survives long enough, passes through four distinctive stages of mining: (1) The open-pit stage, in which the mined material is hoisted by means of "endless-rope" inclines, by "aerial gears," or by both. (2) The open-pit stage in which the mined material is dumped down chutes to an underground main level, from which it is hoisted to the surface through a vertical shaft located outside the crater. (3) The open-pit stage and the underground stage combined. Mined material all handled from one main level and hoisted through vertical shaft. (4) The underground stage alone. It is only with this fourth and last stage of mining that this article is proposed to treat.

FIRST STAGE IN DIAMOND MINE DEVELOPMENT—WESSELTON OPEN PIT WITH ENDLESS-ROPE HAULAGE TO SURFACE

The following local terms will be used during the course of this article, "pass," meaning an ore chute sunk from the working levels to the main level, "blue ground," meaning the diamond-bearing rock, or ore, "reef," meaning the waste rock, "boy," meaning a native miner of any age. A mine spoken of as an "old mine" is not intended to mean old as reckoned from date of discovery but old in length of time of active and continuous development. When the "oldest" of the Kimberley mines were forced to abandonment as open-pit mines, owing to the heavy caving of the unsupported rim rock surrounding the craters, a number of underground systems of mining were tried, with more or less, principally less success.

THREE STOPING SYSTEMS IN OPERATION.

The problem was successfully solved about 1888 by Gardner F. Williams, of Washington, D. C., who was general manager of the DeBeers Consolidated Mines from the date of its incorporation until June, 1905, when he resigned. Mr. Williams through his management of this company has probably done more than any other individual man in placing the diamond industry of the world on the firm basis on which it now stands.

The first successful underground system of mining as originally put into operation has been modified and changed from time to time to suit the changing conditions met with as greater depth was attained and to meet the requirements of the vastly greater areas of the newer mines as they were developed.

There are now three distinct underground stoping systems in use. For convenience these will be called the DeBeers, the Kimberley, and the Dutoitspan systems, from the mines in which they were developed. As the general development and layout of all of the mines are practically the same, no matter what the stoping system employed, a general description of this will first be given. It is to be noted that the drawings, plans,

and sections shown in this article are general plans and not taken from the plans of any one particular mine, and could with certain changes and modifications be applied to any one of the five mines of the group.

Vertical Shafts Sunk in Rim Rock.

In anticipation of the underground stage, vertical rock shafts are sunk in the hard rim rock surrounding the craters at a distance of from 1000 to 1500 ft. back from the edge. (See Figs. 1, 2, and 3.) This distance is necessary in order that the shafts may be permanently protected against caving into the open pit; surface cracks due to the caving of the crater sides have appeared at distances of 600 ft. and more from the original edge of the craters.

The latest practice is to make these shafts, five compartment, 27 ft. 2 in. by 8 ft. 6 in. outside timbers. They are provided with two skipways 4 ft. 10 in. by 7 ft. in the clear; two cage compartments, each 4 ft. 7 in. by 7 ft. in the clear, and one pipe and ladderway 4 ft. 10 in. by 7 ft. in the clear. The shafts are sunk about 100 ft. below the first predetermined main hoisting level, which in Figs. 2 and 3 is the 640-ft. level. A station containing a large sump, pumping station, and the necessary excavation for loading pockets, etc., is cut and the main-level tunnel driven to intersect the crater. This tunnel may be from 14 x7 ft or 8 ft. to 16x9 ft. in section.

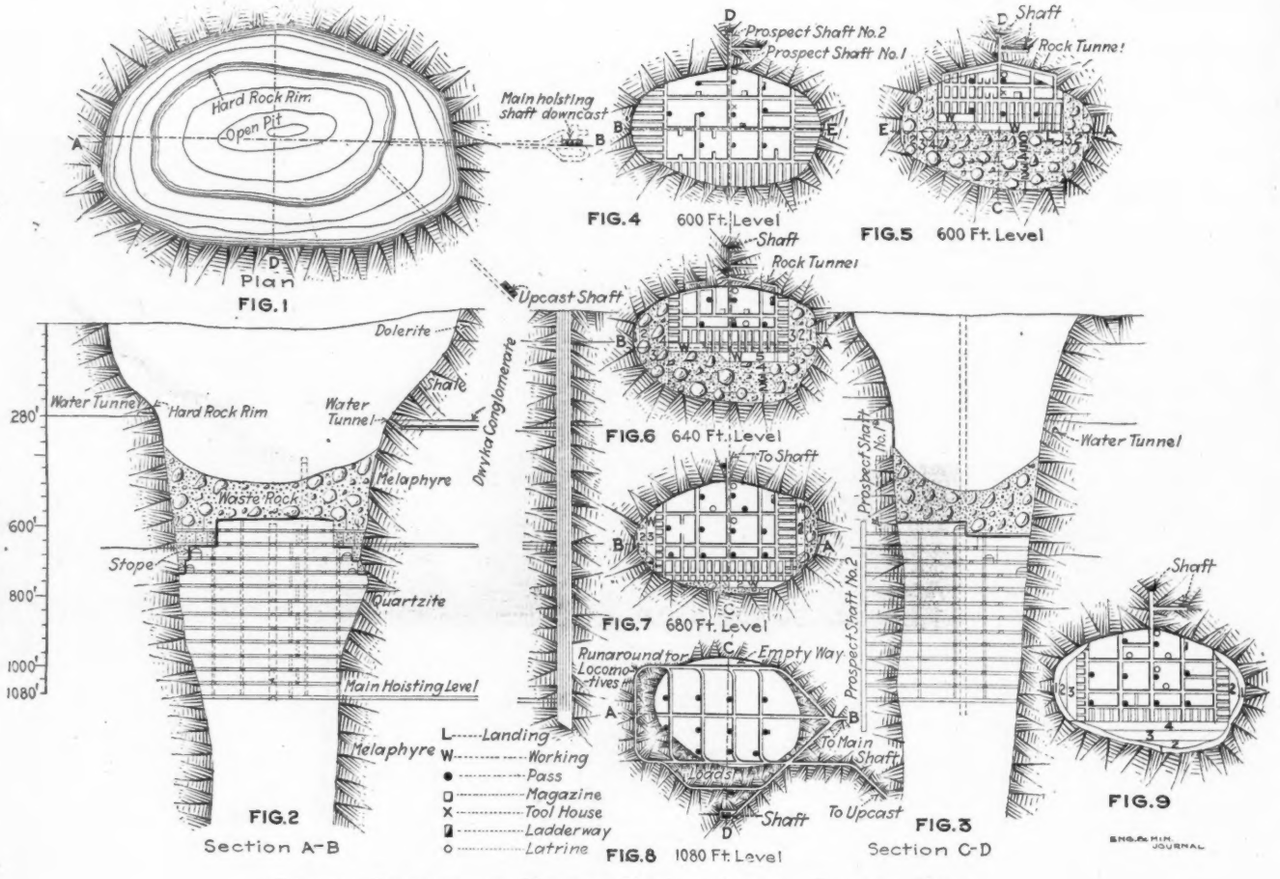
Meantime from the open mine, near the elevation at which it is judged that open mining will have to be abandoned, a tunnel is driven back into the rim rock a distance of from 50 to 100 ft. From the end of this tunnel a smaller shaft, about 10x8 ft. in the clear and having three compartments, two hoistways, one pump and ladderway, is sunk also to the main level. As the sinking progresses in this shaft stations are cut every 40 ft., from which the working levels or sublevels will later be driven. This shaft is known as Prospect Shaft No. 1, and serves as a means of communication for the transporting of men and supplies from the main level to the various working levels during the time required for the development and extraction of the blue ground between the first main level and the bottom of the open mine.

Plan of Development Depends on Haulage System

When in sinking the prospect shaft the elevation of the main level is reached, the development of this level is pushed as rapidly as possible and the main tunnel generally started towards the main hoisting shaft and driven until the two faces meet. The plan of development of the main level will depend greatly on whether endless-rope or electric haulage is to be used, also on the shape and area of the mine. In Fig. 8 is shown a main level developed for electric-locomotive haulage.

The sublevels have meanwhile been started from the stations cut in the prospect shaft. Vertical passes six to 10 ft. in diameter are sunk from various predetermined points and carried down from level to level in the crater material or blue ground itself until they reach the main level where they are equipped with "loading boxes." The passes serve as ore chutes, and as quickly as the main shaft and hoisting level can be equipped to handle it, the last of the ground available for mining by the open-pit method is dumped down the passes to the main level and hoisted to the surface through the shaft. Some time before all the blue ground lying above the first main level can be extracted, falls of reef will have covered over the exposed blue in the open pit and brought that mode of mining to an end. The remainder of the block will then be taken out by underground methods.

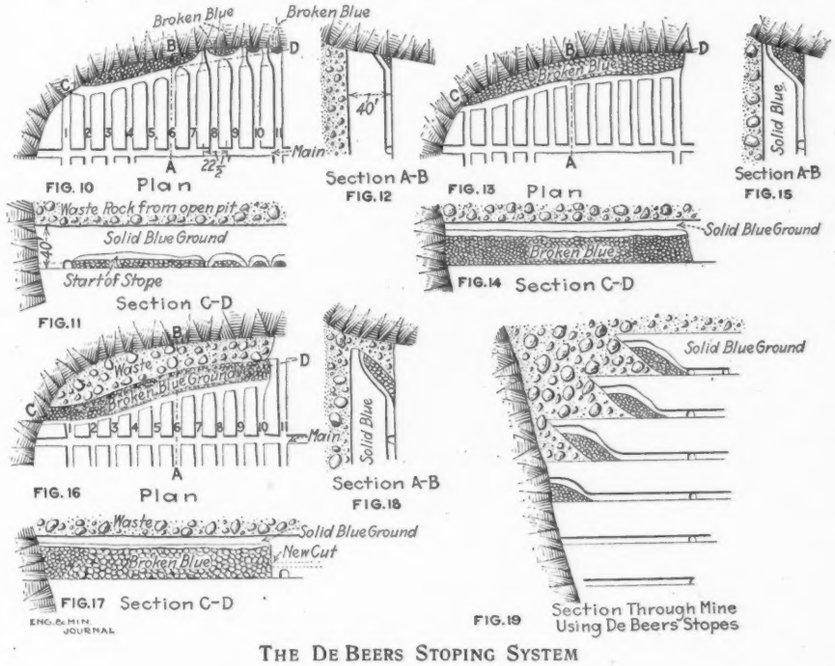
Anticipating in plenty of time the exhaustion of the blue above the first main



General Development Methods Used in African Diamond Mines

level, the main shaft is sunk through another predetermined block which may vary between 280 or 520 ft. A new prospect shaft is sunk and a new set of sublevels, main level, etc., prepared, so that there will be no undue delay in the mining operations when the time comes to "shift the gear." This operation has been accomplished with a stoppage of hoisting operations of but two days, which is a remarkable record when the amount of work necessary is considered. A few of the things that must be done to effect such a change are the cutting through and removal of the heavy timbers forming the "pent house," connecting up the timbering and guides of the two shaft sections, the changing and adjusting of four ropes and a thorough test of the whole layout.

The mine illustrated in Figs. 1 to 9 is mining in the second vertical block below the open pit. The 1080 ft. is the main level and Prospect Shaft No. 2 connects the former main (640 ft.) with the new main and the sublevels. When a mine has reached the stage of exploitation illustrated, it will probably be necessary to sink a second large rock shaft to provide a second means of escape as required by law and to maintain the ventilation system. The second escape and ventilation has been taken care of up to this by the prospect shafts and the open pit; but this opening becomes increasingly hard to maintain and there is always danger of its being completely cut off. One other feature of these mines has also, during the course of the operations described, been attended to, the driving of a drainage tunnel completely around the mine. The necessity for this tunnel will be taken up further on.



THE DE BEERS STOPING SYSTEM

SUBLEVEL DEVELOPMENT IDENTICAL IN ALL MINES

The general method of development followed on the sublevels is identical in all mines, no matter which stoping system is used. In Fig. 4 is shown how the 600-ft. level of the mine in question would be developed in preparation for stoping.

The tunnel plan of these levels is based on a checkerboard system, the unit square of which is 22½×22½ ft. All tunnels are driven on 22½-ft. centers or multiples of this number such as 45, 90, 180, etc. The tunnels are driven on a grade of from ½% to 1% from the prospect shaft so that all drainage is towards the shaft where it is conveyed in a large drainage pipe column to the main level and from thence to the sump at the main shaft.

The plan followed in developing all sublevels is the same, the method of procedure being as follows: The rock tunnel from the prospect shaft is continued straight across the crater until it meets the rock at the opposite sides. At regular distances of from 90 to 180 ft., or even greater, depending on the area of the mine, tunnels are turned right and left from the shaft tunnel and from these in turn other tunnels are turned right and left until the level is divided into a giant checkerboard with squares from 90x90 ft. up to say 270x270 ft. The tunnels are all driven on accurate centers established by exact surveying, as it is highly important that every tunnel be vertically over the corresponding tunnels on the levels below, thus throwing the pillars in vertical alignment.

As the points determined on for the various passes and ladderways are reached, these are sunk to the next level 40 ft. below. If it so happens that it is imperative to rush the development, the passes are used as shafts and the development of the sublevels pushed from a number of points of attack. The tunnels driven parallel with the long axis of the mine are designated as "mains" and are numbered consecutively on 22½-ft. centers whether driven or not.

MINE LAID OUT ON COORDINATE SYSTEM

The shaft tunnel is considered as the dividing line between north and south or east and west, as the case may be; thus in Fig. 4 coming from the shaft the tunnels turned to the right are "mains west," those to the left "mains east." The tunnels driven at right angles to the mains are numbered on 22½-ft. centers starting at either extremity of the mine and are designated as Tunnel No. ——, north, or south, or east, or west, as the case may be, of some main. In Fig. 4 the west side of the mine has been chosen as the base from which the tunnels are numbered, and the tunnel from the shaft is No. 12, and as an example of location the portion of this tunnel between the first main and the shaft would be spoken of as No. 12 north of No. 1 main. Permanent survey points are established as a rule at the 90-ft. junctions and their number indicates their location, thus the number (12) tells the surveyor instantly that he is at the junctions of No. 1 main with No. 2 tunnel and he, of course, knows what level he is on.

Each level is provided with two magazines, one for fuse and caps, the other for dynamite, a tool house and a latrine, all of which are chambers cut in the blue on the line of a future tunnel. The levels are also supplied with fresh drinking water, compressed air, electric light, and fire service through the prospect shaft. Every tool house contains a "first-aid kit" and if the mine is carefully managed, every white man on the level will have taken a course of training in first aid. The mines are lighted throughout with electric light, except in the stopes, where candles are used. A number of experiments have been tried with other forms of light in the stopes, but in the hands of the native the ordinary mine candle has proved the most satisfactory and economical.

NO TIMBERING REQUIRED IN DRIFTS

From the tunnels and mains nearest the rim rock tunnels are turned on 22½-ft. centers and driven to the rock (see Fig. 4) and the level may then be considered developed for stoping. The tunnels as driven for development are generally about 6 ft. wide by 7 ft. high,

except where double track is required, when they are widened to about 10 ft. The roof is roughly arched and in good ventilation, the 6×7-ft. tunnels will stand indefinitely without timbering, except in a few isolated sections where treacherous ground may make it necessary to put in a few sets.

Tunnels in the blue wider than 6×7 ft. must, as a rule, be timbered throughout with sets consisting of a cap and two posts spaced from skin to skin up to 3- or 5-ft. centers. These timbers seldom exceed 18 in. in diameter on the working levels, the average being about 10 in., as only in special places such as junctions, etc., are the timbers required to support any great pressure, the principal duty of the timbering being to catch and support pieces of roof that may work loose and fall, and for this purpose the timbers are lagged on top and sometimes on the sides also with 2- or 3-in. lagging boards, the space between the roof and the top of the sets being filled with old timbers. Most of the round timbering in the mines is cut from the "blue gum" or eucalyptus tree, which grows in Cape Colony. The squared timbering used for shafts, etc., is generally California redwood, which costs delivered at Kimberley about 92c. per cu.ft. The blue ground obtained in driving the development tunnels is handled by the prospect shaft until the passes are through and the new main equipped for handling it.

Shrinkage Stopes Used.

The three systems of stoping used in these mines all come under the general head of overhead shrinkage stopes in which the backs may or may not be caved; in fact, the systems used employ so many features that a descriptive name can not be given without being cumbersome, as will be made clear as the description progresses. As shown in Figs. 5, 6, and 7, the stopes may be started on three sides of the mine simultaneously, retreating toward the prospect shaft; the order in which the various cuts have been made is indicated. Eventually the last line of stopes on any level must be made parallel to the side of the mine opposite the prospect shaft.

To obtain the blue from the last two or three cuts or stope lines, short rock tunnels are driven right and left from the shaft tunnel, as shown, 10 to 25 ft. back from the side of the crater. From these tunnels short offsets on 22½-ft. centers are driven to connect with the corresponding tunnels previously driven in the blue. The blue ground obtained in the last operations on the level after the passes in the blue itself have been covered over, is loaded out through these rock tunnels and dumped down a special rock pass which has been sunk to the main level. See Figs. 5, 6, and 8. As the various passes and ladderways are met by the retreating stope line, they are carefully covered over with heavy timbers and are then only used from the next succeeding level down. As far as possible the stopes are put up in straight lines across the crater so that the retreat may be as nearly uniform as can be made. Owing to the fact, however, that the blue immediately next the wall rock is apt to be treacherous, it is frequently necessary to make the first stope a narrow one not over 10 to 15 ft. wide and following the rock contour. The succeeding stopes are then so located as to bring the line of stopes back to a straight line.

De Beers Stoping System

The essential characteristic of the De Beers system is a long overhanging back inclined in the direction of the short axis or width of the stope (see Figs. 10 to 19). The degree of inclination is approximately the angle of repose of the broken ground, 30° to 45°. A stope is started by first measuring back from the rim rock exposed in the 22½-ft. centered tunnels the distance decided on for the width of the stope. (See Figs. 10, 11, 12.) The tunnels are then widened out and heightened until a long gallery is formed the proposed length of the stope, as CD Fig. 10. The surplus broken blue, amounting to 40% to 60% of the total broken, is loaded out, leaving a sufficient amount for the men to stand on to reach the roof.

The stope is then carried up, maintaining the incline and loading out the surplus until it reaches the point shown in Figs. 13, 14, and 15. At this point there remains but a few feet of solid blue between the workers and the overlying waste rock. In other words, the stope is 30 to 37 ft. high. The thickness of this final shell will depend on the nature and weight of the material known to lie above.

It is now necessary to decide, if no miscalculation has been made and the back has not crushed, whether or not "to bring in the stope." If it is known or reasonably inferred that fine reef lies immediately above it will be the best policy to leave the final shell intact, in which case all the broken blue remaining in the stope is loaded out and a new stope started in front of the first. The back or shell of the first stope will eventually crush and fall on top of the stope that will in time be "put up" from the level next below, and from which or subsequent levels it will be eventually partially or wholly recovered. If it is known that crushed blue either from the level above or from the abandoned workings of the open pit lies directly above, the stope will be brought in by placing and blasting, a final extra heavy round of holes. The blue is then loaded out and loading continued until nothing but waste rock, or blue so badly mixed with waste as to make its recovery unprofitable, shows in the loading places. The stope is then abandoned and a new stope started in front.

Stope Retreats Towards Prospect Shaft

The second stope, in the absence of a back pillar, the use of which will be explained later, presents a little different problem from the first stope, which is against the solid rock side of the crater. The second stope must be put up against the waste rock that has in the meantime completely filled the old stope. (See Figs. 16, 17, and 18.) The method of procedure, however, is practically the same, the pile of broken blue resting against the reef, which has assumed its angle of repose, and the stope is carried up in the same manner as the first.

In this way, step by step of varying widths, the level is mined out, retreating towards the prospect shaft. While the levels are sometimes stoped from three sides at once, the line of final retreat must be from the side opposite the prospect shaft. When "mud rushes" were an ever present danger in the De Beers mine, a level was stoped from but one side at a time in order to obviate the danger of the miners' retreat being cut off by a side rush.

The stopes shown in the drawings are approximately 250 ft. long; but no stope today either in the De Beers or Kimberley mines can be put up anywhere near this length; in fact, a stope 100 ft. long is becoming a rarity, and stopes but two or three offsets long (45 to 65 ft.) are frequently put up in the two mines mentioned. The reason for these short stopes is the restricted area of these mines, and chiefly, the tremendous pressure of the overlying reef. I have seen stopes crushed in before they had gone up 15 ft. As this is the ultimate object sought, it might at first glance be thought that this would be of great advantage, but all the material to be economically handled must be broken up so that the largest lumps can be easily lifted by two men. When a stope crushes prematurely, a tremendous amount of blockholing and "bulldozing" must be done to break up the large masses of blue, working from the cramped space of the offsets. In addition, if fine reef lies over the crushed stope, it soon filters down into the loading places and becomes badly mixed with the blue. It will take twice as long, if not longer, to recover the blue from such a stope, if indeed it is recovered at all, as from a stope that does not prematurely crush. It frequently becomes necessary in such cases

either to timber in, as at Kimberly, or abandon the stope altogether, trusting the recovery of the blue to the level below.

THREE METHODS OF DRILLING USED

In drilling the stopes three methods are used, "hand hammer" single and double, "long jumper" and compressed-air drills, all three being frequently used at the same time in the same stope. Holes vary from two feet up to 10 and 15 ft., and in extreme cases even 20 ft. in depth. The average depth is between two and six feet. Dynamite 30% and 40% manufactured at the company's own plant is used for blasting in the blue. Blasting in stopes and tunnels is done at the end of each eight-hour shift, the succeeding shift loading out the blasted ground and drilling the next round. Bulldozing and blockhole blasting, however, go on at all times, and there are few periods except at change of shifts when the sound of blasting is not heard in the mine. One or two white miners on a level, depending on the extent of the workings, spend their whole time blasting lumps and supervising the loading boys.

All manual labor about the mines such as drilling, loading, tramming, etc., is performed by natives under the direct supervision of white miners. The blue is mined from a level either by contract or by the company. A contract may be let to three men at a specified price per load of 16 cu.ft. extracted, and a specified price per foot for driving tunnels; but the present tendency is to do all this work company account, which is probably the best plan in this class of mines where it is necessary from time to time to restrict the output.

In Fig. 19 is shown a cross section of a mine using the De Beers stopes. It will be noted that the stopes from the levels below come up under the abandoned stopes of the levels above. In no case are stopes ever put up under a working stope above, an interval of at least one and preferably two or three stope widths is maintained to insure the safety of those working above. The 40-ft. interval between levels has been found by experimenting with other intervals to be the most satisfactory and economic that could be adopted.

(To be concluded.)

DEPOSITING AND WEATHERING FLOORS FOR THE DE BEERS DIAMOND MINE

Cobalt Compounds as Driers for Paints

The use of cobalt compounds as driers for paints was discussed by V. P. Krauss before the International Congress of Applied Chemistry, a use which seems to open up a promising field for this metal. The present driers on the market are not all adapted to the purpose, as cobalt salts are only active as driers in the trivalent state, while the ordinary compounds of commerce are bivalent and sufficient care has not been given to oxidizing the metal in making up the drier. The best salts are the resinates, oleates, linoleates, oleoresinates and tungates. The cobalt is oxidized by aspirated air, or better, by solid or liquid oxidizers.

Big Creek Gold District, Idaho

BY ROBERT N. BELL*

Mining development by prospectors and small operators that has been quietly carried on for several years past, has reached a stage in the Big Creek district that definitely indicates the ultimate development of an important gold-producing district in central Idaho.

This district is situated 90 miles east of the nearest railway terminal at New Meadows on the Pacific & Idaho Northern R.R., with which it is connected by a well surveyed wagon road that was largely built at state expense. The completion of the Idaho Northern Railroad, now being constructed with a large force of men to Long Valley, will afford another route to the Big Creek district, which will be 77 miles from Thunder City, by which route the district can be made more accessible at a moderate cost of wagon-road construction.

The Big Creek district covers a section of rugged, mountainous country, consisting of high, sharp ridges, and cañons with elevations ranging from 6500 to 10,000 ft. above sea level. It is situated near the center of the great granite batholith of central Idaho in southern Idaho County, between the South and Middle forks of Salmon River.

*State mine inspector, Boise, Idaho.

The Big Creek mining district is not exactly a new district, for during the unfortunate Thunder Mountain boom in central Idaho about 10 years ago, some of its properties acquired an unenviable reputation by reason of unwarranted wildcatting operations of that period, but not a single instance of intelligent mining development was then recorded, and as a matter of fact 90% of the money raised from the sale of stock based on Big Creek properties during that period was used for promotion purposes and never reached Idaho.

The orebodies of this district in the main are low grade, but of apparent large extent. The principal mineral zone strikes north and south across the upper tributaries of Big Creek and extends over to the South Fork drainage on Profile Creek, covering a distance of fully 15 miles of richly mineralized territory, the principal showings of which, while of a distinct fissured type by their general north and south strike and steep easterly dip with clearly defined wall casings, also fall under the classification of disseminated deposits by reason of their great size and the general dissemination of mineral contents through great widths of ore. The lode widths so far determined vary from 100 to 300 ft.

The principal group of claims, on which work has been done, are as follows: Blaine, Independence, Gold King, Laufer & Davis, Moscow, Ellison and Sunday. The development so far on these deposits consists essentially of crosscut tunnels which are all comparatively shallow and obtain underground face depth on the orebodies in no place exceeding 200 ft. and generally within 100 ft. of the surface. They are invariably, however, run at right angles to the strike of the ore zones and appear to determine one thing, that the ore deposits contain primary unaltered sulphides which on the northerly heavily timbered slopes of these high mountain spurs continue to the surface. On the south slope exposures of these great zones, the surface oxidation and free panning rock is more generally found, but in these cases rarely extend down 50 feet.

The district seems to carry a parallel series of three great lodes, the east lode showing the most free gold, the middle one massive quartz and pyrite, and the westerly one more barren quartz. While the ore is of low grade, the apparent feasibility of local treatment, indicated by several important tests by amalgamation and cyanide methods, together with the evident large extent of these deposits, warrants the anticipation that with sufficient capital for large milling plants, some extensive and fairly profitable gold mining enterprises may be ultimately instituted in this district.

It is true, the district is remote and difficult of access at present, but as an offset for this isolated position the natural conditions for economical adit and crosscut-tunnel development and drainage to great depth, the unlimited timber resources and water-power resources, with which the region is blessed, would form an asset looking toward cheap mining and milling costs.

Knob Hill Report to Stockholders

By B. H. Bennetts*

The accompanying tabulation shows a report issued by the Knob Hill Co. for the benefit of its stockholders. These reports are issued monthly, and are closely studied by the recipients, and in my opinion represent just about what a stockholder needs. This is a practice which might be emulated with profit to the investor by some of the larger companies when making their annual, or semi-annual reports. Explanation of the sheet seems unnecessary. The accounts "real estate," "capital stock," and "reserve" are affected only by entries made at the treasurer's office and are, therefore, not shown on the reproduction, which is the mine sheet. The Knob Hill mine has paid $45,000 in dividends, the last being in May of this year.

THE KNOB HILL CO., REPUBLIC, WASH., SEPT 15, 1912; BALANCE SHEET, MONTH ENDING AUGUST 21, 1912

Accounts	Trial Balance		Inventory	Debits	Credits	Inventory	Net Expense	Earnings
			Aug. 1st			Sept. 1st.		
Blacksmith and Machine Shop	88.90	.....	88.90	.....	.....	83.90	5.00	.....
Powder	232.50	.....	.....	232.50	.....	.....	232.50	.....
Fuse	38.00	.....	5.50	32.50	.....	.....	38.00	.....
Caps	17.75	.....	6.25	11.50	.....	5.75	12.00	.....
Candles	60.50	.....	16.50	44.00	.....	16.50	44.00	.....
Drill Steel	363.55	.....	340.45	23.10	.....	352.65	10.90	.....
Stulls and Timber	83.12	.....	.....	83.12	.....	.....	83.12	.....
Material and Supplies	1859.13	.....	1835.78	23.35	.....	1798.53	60.60	.....
Assaying	90.00	.....	.....	90.00	.....	.....	90.00	.....
Telephone and Telegraph	11.35	.....	.....	11.35	.....	.....	11.35	.....
Freight and Express	0.60	.....	.....	0.60	.....	.....	0.60	.....
Postage	4.50	.....	.....	4.50	.....	.....	4.50	.....
Cartage and Stable	15.99	.....	.....	15.99	.....	.....	15.99	.....
Traveling Expense	30.00	.....	.....	30.00	.....	.....	30.00	.....
Stationery and Printing	4.15	.....	.....	4.15	.....	.....	4.15	.....
Fuel and Light	2.00	.....	.....	2.00	.....	.....	2.00	.....
Rent	20.00	.....	.....	20.00	.....	.....	20.00	.....
Power	884.80	108.01	235.30	649.50	108.01	494.82	281.97	.....
Maintenance, Way and Buildings	.....	.....	.....	.....	.....	.....	.....	.....
Salaries and Wages	1754.50	.....	.....	1754.50	.....	.....	1754.50	.....
Smeltery Returns this Month	.....	.....	.....	.....	.....	.....	.....	2761.81
Repairs to Machinery	8.50	.....	.....	8.50	.....	.....	8.50	.....
Freight on Ore	50.00	.....	.....	50.00	.....	.....	50.00	.....
Interest on account	2.00	.....	.....	2.00	.....	.....	2.00	.....
Combined Totals	5621.84	108.01	2528.68	3093.16	108.01	2752.15	2761.68	2761.81

			Assets and Liabilities		Distribution of Pay Roll	Ore	Developme't	Total
Closing Inventory	.....	.....	2752.15	.....				
Machinery	3794.92	.....	3794.92	.....	Office	.....	.....	325.00
Drills, "Power,"	1034.68	.....	1034.68	.....	Superintendent	.....	.....	175.00
Ore Bins and Buildings	531.04	.....	531.04	.....	Mining, Hand	.....	.....	.....
Office Furniture and Fixtures	423.85	.....	423.85	.....	Machine	301.00	.....	301.00
Cash	496.76	.....	496.76	.....	Mucking	365.50	.....	365.50
Sundry Debtors	108.01	.....	108.01	.....	Timbering	308.00	.....	308.00
Sundry Creditors	.....	.....	.....	.....	Sorting	.....	.....	.....
Mining	89,938.09	.....	92,699.77	.....	Blacksmith	.....	.....	120.00
Ore Returns	.....	191,973.50	.....	191,973.50	Engineers, "2"	.....	.....	160.00
Royalty	47,993.30	.....	47,993.30	.....	Outside	.....	.....	.....
Treasurer	143,980.20	91,317.25	143,980.20	91,317.25	Surveying	.....	.....	.....
Refund Freight Overcharges	.....	10,523.93	.....	10,523.93		.....	.....	.....
	293,922.69	293,922.69	293,814.68	293,814.68		974.50		1,754.50

This report only covers the mine office and does not include Treasurer's office of the Company.
Number cars ore shipped during this period, Smeltery 4; Mill 9.
Number cars ore out for which smelters have not remitted, Smeltery 2; Mill 14.

*Tacoma, Wash.

The Ontario Iron Mine, New York

By Charles F. Taylor* and William M. Booth†

The Ontario Iron Ore Co. owns 108 acres in Wayne County, New York. The ore is soft red hematite, occurring in beds 22 in. thick under 20 ft. of overburden. Keystone drills drive the holes for blasting the overburden, while electric hammer-rotary drills are used in ore. Steam and electric shovels are used in moving and loading loosened material. The ore, averaging 44% iron, is crushed at the rate of 300 tons daily and shipped to furnaces in Pennsylvania.

*Consulting engineer, 80 Broad St., New York, N. Y.
†Chemical engineer, Syracuse, N. Y.

The property of the Ontario Iron Ore Co. lies about four miles south of Lake Ontario and one mile north of Ontario Center, New York. It includes 108 acres of land, sloping slightly to the north.

Mine Worked as Open Cut

The red-hematite belt from Utica and Frankfort passes through this place from east to west at a depth of about 20 ft. The overburden is loam, clay and gravel with a thin layer of shale immediately above the ore. The ore is about 22 in. in thickness. The face of the bed has been broken by the action of water or ice, leaving eroded masses of ore scattered over an area of several rods, north and south. Some of these weigh from 40 to 100 lb. and contain from 30 to 45% of iron.

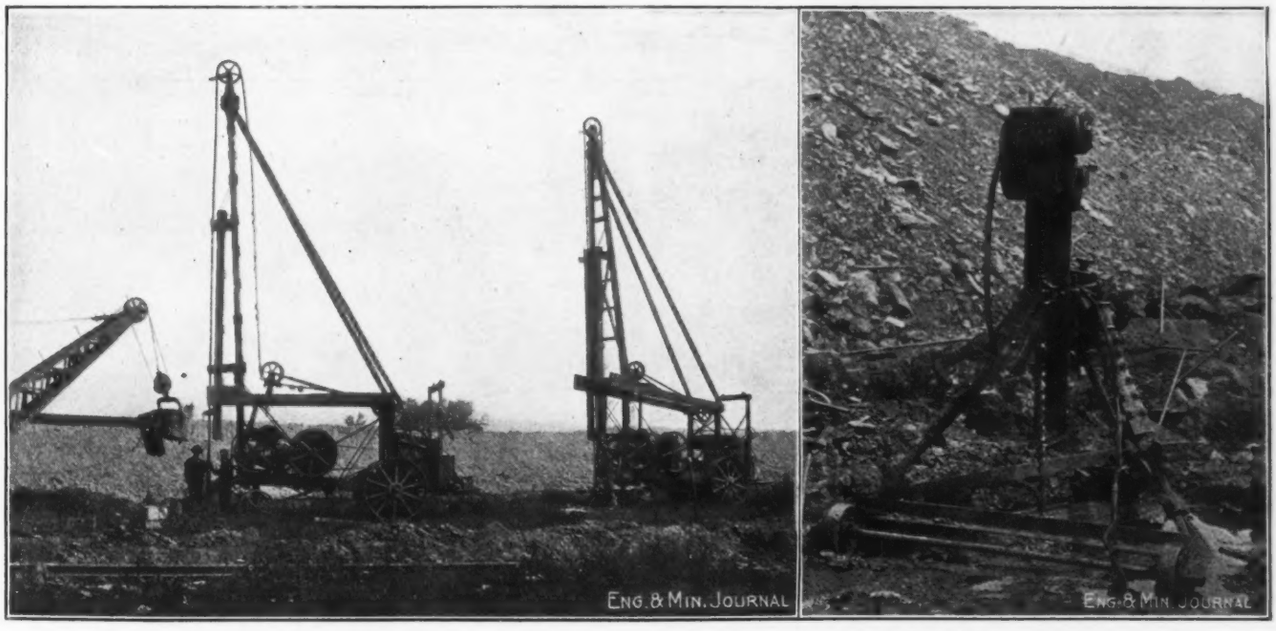
The bed ore is soft, dark red in color and weighs about 220 lb. per cu.ft. Analyses of samples taken at three different points are given in the accompanying table. Moisture and iron were determined at 70 stations. The highest percentage of metal found was 50.19 and the lowest 35.80. The average of all tests was 44% iron.

necessary to handle a large tonnage was installed.

The plant consists of electric drills, a Marion shovel, an electric shovel, a small steam loader, locomotive, stationary boilers, crusher and repair shop.

The earth is drilled and shot about 25 ft. ahead of the cut and parallel to it. The drilling for the use of explosives in blasting the overburden is done by Keystone drills. Power is furnished by direct current generated by a small generating plant at the entrance to the quarry. The drills have heavy stems and are making from 60 to 100 linear ft. per day, of which about one-third is through shale and limestone overlying the ore. The 6-in. holes drilled by these machines are spaced from 15 to 20 ft. apart and about 50 lb. of 40% dynamite are used in each hole to break up the rock and loosen the material overlying this. These machines are giving good results, at a small cost per cubic yard moved.

The loose earth and rock are removed by a Marion revolving steam shovel,



Keystone and Electric Hammer-Rotary Drills Used in Open-cut Operations of Ontario Iron Ore Co.

ANALYSES OF ORE OF ONTARIO IRON CO.

	1	2	3
	%	%	%
Moisture	0.18	3.15	0.35
Volatile	3.79	6.35	6.44
Silica	14.68	16.50	15.07
Sulphur	trace	trace	0.03
Phosphorus	0.51	1.10	0.47
Manganese	trace	trace	trace
Aluminum oxide	3.20	0.00	0.00
Calcium oxide	3.58	9.25	5.60
Magnesium oxide	0.00	3.16	2.53
Iron oxide	77.66	59.00	69.98
Metallic iron	51.56	41.30	48.28
Metallic iron, dry ore	51.65	42.64	48.45

Ground was broken in June, 1907, when a switch was run into the property from the New York Central railway, which forms the southern boundary. Shortly afterward a steam shovel was set up and a cut of about 1600 ft. was made on the northern edge of the orebody. A standard-gage track was laid the entire length of the cut and ore was loaded directly into cars by a gang of Italians.

A few trial shipments proved the usefulness of the product and the equipment model 250. The boom is 65 ft. long and a vertical lift of 45 ft. is possible. The dipper is of 3½ cu.yd. capacity. This machine will excavate and dump the material a distance of from 70 to 75 ft. from the center of the rotating journal. Two swings per minute are made through an arc of 180° and 2000 cu.yd. can be moved per day of 10 hours.

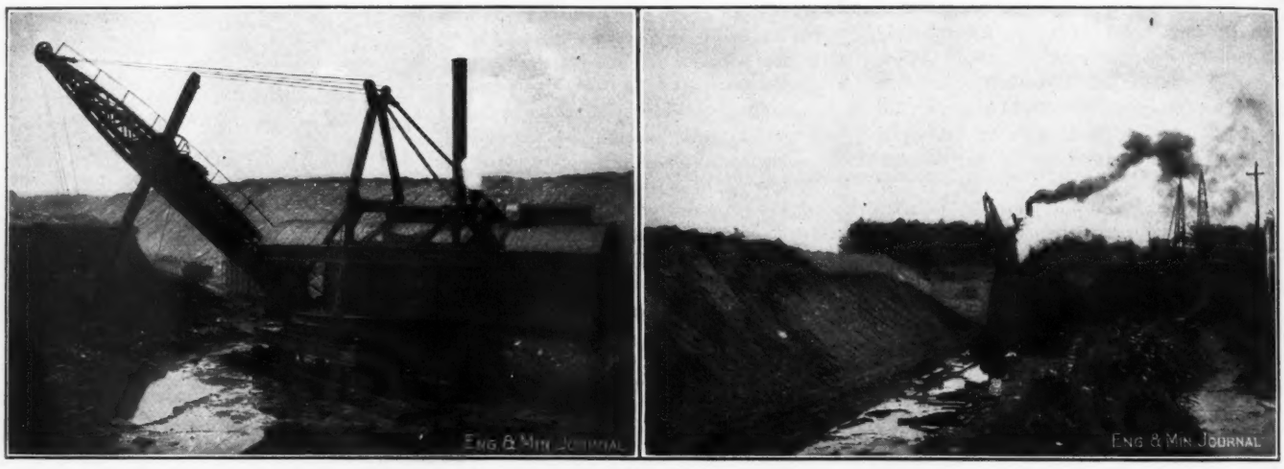
A Hammer-Rotary Drill Used

The drill used for driving the holes in the orebody was specially designed for

this work by the Dulles-Baldwin Electric Drill Co., of New York, being a combination of the well-known hammer and rotary principles. A twist drill of the ordinary type is used, this is held in a chuck on which a blow is struck by an air-cushioned hammer which receives its impetus from an electric motor mounted on the drill. Rotary drills of the ordinary type were tried but proved unequal to the task of penetrating layers of limestone with which the ore is in spots interwoven; it was necessary to introduce the hammer principle to successfully drill this rock.

The rotation of the drill steel is continuous, which not only causes the drill to bore into the ore, but also by means of the helix in the steel, to clean the hole of muck. The actual current consumption is about ¾ hp. The feed consists of the ordinary screw and crank running in a guide shell which in turn is mounted on a tripod. The legs of this tripod are set in the corners of a three-wheeled truck, as shown in the accompanying illustration. When the operator has finished his hole, he cranks back the drill and pulls the truck over the level body of exposed ore to the point where he wishes to drill the next hole. Each drill will average about 200 two-foot holes in a working day of 10 hr., the cost per linear foot drilled being less than 1½c., including power, labor, interest and depreciation.

After the ore is broken by dynamite, it is loaded into standard-gage cars by the small shovel. At this point, it is interesting to note the difference in the content of iron in the bed and loaded ore. This difference averages 4%, being greater in the bed.



MOVING OVERBURDEN IN THE 1400-FT. CUT AT ONTARIO IRON MINE

LOADING AND CRUSHING OPERATIONS AT ONTARIO IRON MINE, ONTARIO CENTER, N. Y.

CRUSHER CAN BE RUN BACKWARD

The ore is hauled to the trestle above the crushing plant. It is unloaded by gravity into the crusher especially designed and planned for this work by Butterworth & Lowe, of Grand Rapids, Mich. The opening for receiving ore is 24x36 in. and the crusher will easily handle 70 tons of ore per hour, if kept in continuous service. Power is furnished by a 30-hp. Westinghouse motor with a controller so that the crusher can be run in two directions as the operator may desire. This has proved a great advantage, as it enables the crusher to be operated when the jaws are plugged so tight with ore as to stop the machine. By reversing the controller and running the machine backward, the plugging can be removed without any trouble or extra labor.

The principal disadvantage in connection with this process is the passing of fine ore from the car into the crusher, as the fine ore carries moisture enough to prevent it from sliding easily down a slope of about 45°. This type of crusher has been in use on this work for abouf four years and has made a great reduction in the cost of handling by avoiding the use of sledges in a quarry and the breaking down of the ore to the proper size.

TREATED PIT WATER USED

The water supply of the plant was taken from a small stream which was inadequate in amount and poor in quality. The boilers scaled so rapidly that they required almost constant attention. A

new supply was piped from the adjoining property but was also of exceedingly inferior quality for steam purposes. To overcome this difficulty, electric power was installed throughout. This proved expensive and a change seemed necessary. Examination of the creek and pit waters showed little chemical difference, except the presence of enough finely divided ore to color the latter a dark blood red. As several thousand gallons of pit water have to be pumped daily, it was decided to soften this by the lime-soda process. This has been done since last spring.

The plant consists of two 5000-gal. wooden tanks equipped with stirrers and connections. No filters were installed nor are they needed, as the heavy suspended ore particles unite with the precipitated lime and clear the water in about 1½ hr. The boilers are kept clean and free from scale. The locomotive boiler foams under heavy load if not emptied once in two days. The cost of chemicals per thousand gallons is about three cents and the present tanks can just about handle the boilers of the property.

An analysis of the raw water gave the following results, expressed in parts per million: Total solids, 708; chlorine, 45; calcium oxide, 120; magnesium oxide, 50; sulphur trioxide, 193; alkalinity, 230; hardness, 314. The purified water has been softened so that it contains: Calcium oxide, 19; magnesium oxide, 17. A record of the degree of water purification was kept for about two months. Samples were taken from the pit, from the interior of each boiler and from the softening tanks and shipped to the laboratory in quart tin cans. The average of these tests shows the hardness to be best maintained at from 55 to 85 parts per million.

The daily output of ore is about 300 tons, and it is possible to exceed this figure with the present equipment. The ore is shipped to iron furnaces in Pennsylvania. John E. Burke, who was formerly on the Chicago drainage canal, is in charge of the operation.

New Railroad Construction

Some new railroad construction, which is of interest to mining men, is as follows: On the Florence & Cripple Creek R. R., the engineering department is now making surveys for the rebuilding of the narrow-gage line recently damaged by floods. The line may be built to standard gage.

In Nevada, the Southern Pacific intends to tap the southern mining field from Palisade through Goldfield and Tonopah to Keeler and eventually to continue the road to Los Angeles. Preliminary surveys are about to be made. It is said that the line will run from Palisade, Lander County, Nev., on the main line of the Southern Pacific, to Austin, thence down Smokey Valley to Goldfield junction, thence to Tonopah, Goldfield, Cuprite, Ubehebe and finally to Keeler, Inyo County, Calif. It is reported that the Nevada-California-Oregon R.R. will soon begin the construction of a broad-gage line from Reno to Doyle, Calif., connecting at that point with the Western Pacific Railroad.

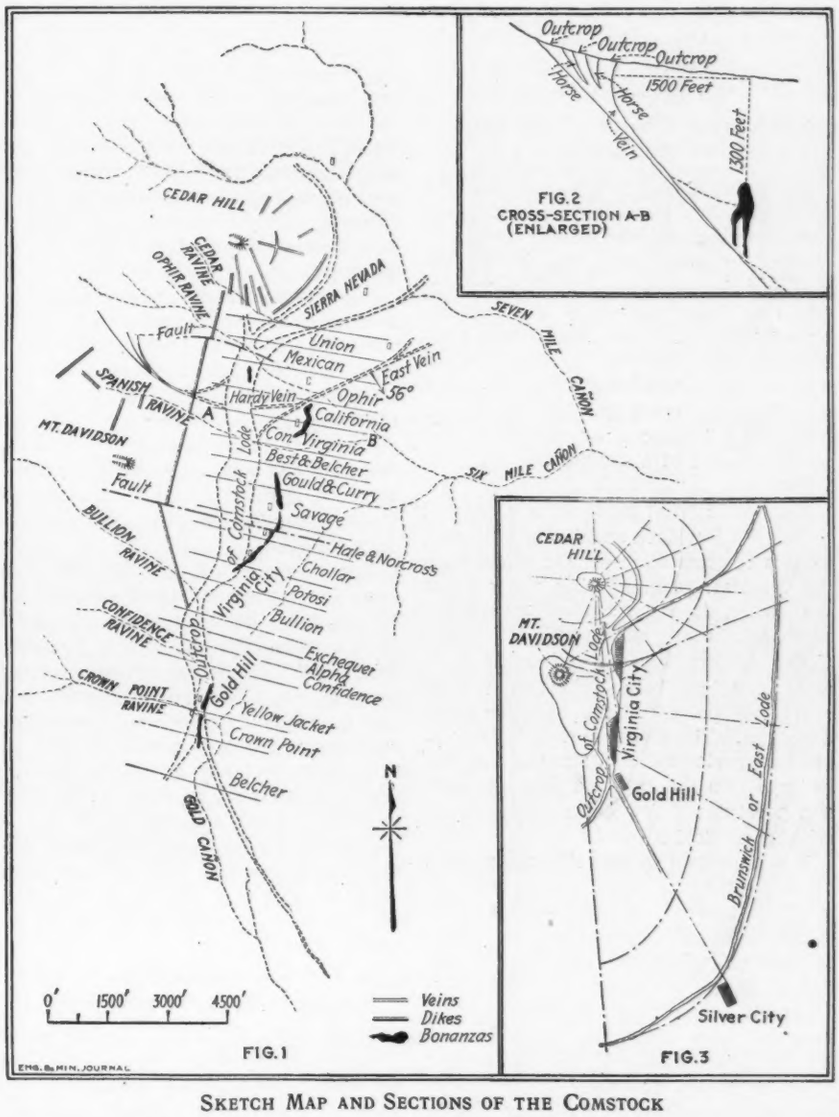
Vein Systems of the Comstock

By Dwight T. Smith*

The outcrop of the Comstock lode is along the junction of the steepest slope of the range and the first slope at the base. The range, however, is cut into spurs by ravines that lead down from the ridge. The position of the lode is across the mouths of the ravines and along the ends of the spurs at their foot. It is contrasted in color in many places from the rest of the immediate rocks on either side by a reddish tint and occasionally also by a prominent exposure of quartz.

The upper or western portion of Virginia City is built along the outcrop. Other appearances on the west or upper side are significant. When looking from the town toward the hillsides and into the ravines, fin-like prominences of dike and quartz croppings are seen, while some are not in evidence except by close inspection. Two of the spurs have rather noteworthy, prominent extremities; one being Mt. Davidson and the other Cedar Hill. These have proved to be of more importance than any of the others in connection with the vein systems.

Fig. 1 is a map showing to scale the outcrop of the lode, its branches, position of the "bonanzas" and adjacent veins and dikes. Fig. 2 is intended to show by means of cross-section the reason for the "bonanzas" that appear in position east of the outcrop on the map. This is a consequence of the dip which is shown. It is taken from Monograph



Sketch Map and Sections of the Comstock

*Box 531, Virginia City, Nev.

III, U. S. Geological Survey. Fig. 3 encompasses the district, and the Occidental or Brunswick lode is consequently included. This figure also shows, in an ideal manner, the structural lines belonging to the vein systems.

The arrangement of the veins and dikes seems to betray two rather central systems, both sending out rays and developing concentric curves about each center.

When the material was segregated for this brief outline from the map and notes that I have made of the district, some of the faults were overlooked and others were purposely omitted, since it was thought they would unnecessarily complicate the drawings. It was intended, however, that the foot-wall faults in Spanish Ravine and the one in Confidence Ravine be shown. The others are mainly both those in the country east of the lode and the faulting west of the mountain.

Tongues of Diorite in Overlying Andesite

Early in 1908, I discovered that the diorite of Mt. Davidson projected into the overlying andesite in the forms of tongues or apophyses; that it had assimilated the andesite around its border; and that large masses of the andesite were suspended in it. What these phenomena had to do with the vein systems was not discovered until after the veins and dikes had been mapped. There are many like instances of intrusion, but without record of a similar dike and vein system.

The whole point made in this account is that Mt. Davidson and Cedar Hill were centers of great moment. The effect from the Davidson center being many times the larger, is far reaching toward the northeast, east and southeast. The Cedar system on the other hand is more circular, being effective toward nearly all points of the compass from its center. The Cedar system is later in point of geological age, since it has sent its rays into the mass of Mt. Davidson and possesses a few concentric arcs ascribable to itself.

It is important to note that the periods of vein filling of each system are not readily separable. They appear, at least in part, to be contemporaneous. It should be said that since the Davidson formation preceded the Cedar, the latter undoubtedly utilized many of the structural lines that were favorable. In such manner the Cedar appears to have had greater effect in certain directions in the Davidson than in any other direction outside of it.

The reasons that are entertained for the formation of the space occupied by the lode and its appendages are not intended to be a part of this account, but since a cause appears in the rendering it is desired that it be not accepted as having any other effect than structural, as is shown in the arrangement of the dikes and veins. The main cause for the opening of the space came later and is reserved for subsequent discussion.

Hardy Vein Discovered in 1877

The mining of ore from the "bonanzas" occupied the attention of the miner while they were profitable, but their wane was a strong incentive to search for others. The Hardy vein was discovered in 1877. It is an east branch from the lode, but was found to merge into another vein which has also been proved to be a branch of the main lode. This branch was discovered in 1880 and has been a good source of production for the last 10 or 12 years. It is now referred to as the East vein.

This vein, at the point where it leaves the main lode, has the same dip of about 45° to the east, but, upon diverging it gradually steepens its dip to about 50°. The course of this vein is nearly northeast (magnetic); that of the Hardy about 10° north of east and of nearly vertical dip. Then opposite to the Hardy is a singular branch to the west. This vein is well exposed throughout its northwestern extremity; and at one point near the surface several thousands of dollars were extracted.

Fig. 3 is intended to show in extent the structural effect of the earlier system upon the district as well as that of the later system. The Brunswick or East lode is included, and at the south end of the main lode in Silver City, there is a conformation illustrated in the veining. But here again is imposed from another center a system similar to that of the Cedar, the effect of which has not been fully followed.

The methods of investigation have been the reverse of those usually employed, in that the geology, somewhat remote from the mines, was done first. The discovery of the systems was the result of induction rather than due to inspection *a priori*. I am alone responsible for the results of this investigation, and any errors are mine. I wish to express my gratitude to Whitman Symmes for the opportunity of visiting the Mexican mine; and to Thomas McCormack for visits to the Ophir and Consolidated Virginia; also to C. E. Julihn for a similar privilege in regard to the Union mine.

Swedish Iron Trade, 1911

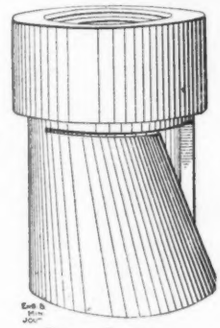
There were 6,153,778 metric tons of iron ore produced in Sweden in 1911. Of this, 5,508,871 were considered first class. No less than 4,094,581 tons carried 60 to 70% Fe, 1,270,566 tons carried 50 to 60% Fe. There were 4,460,619 tons carried 0.100 or over of phosphorus, and 3,517,147 tons carried 0.030 to 0.050 of sulphur, 1,212,559 tons carried under 0.020 of sulphur, and 99,005 tons carried from 0.020 to 0.030 of sulphur.

The Swedish iron works consumed 40,541,332 hectoliters of wood charcoal; 3,698,305 hectoliters of coal, 2,317,667 hectoliters of coke, and 42,197 metric tons of foreign scrap iron.

The production was divided as follows, the items being arranged in descending order of value: Pig iron, 634,392 metric tons; openhearth ingots, 372,705; steel bars, 85,181; iron bars, 146,772; rods and hoops, 63,978; bessemer ingots, 93,853; wire rods 52,185; castings for drawing weldless tubes from, 44,300; cast iron, 39,667; sheets, 22,848; crucible and electric-furnace steel, 4309; total, 1,660,140 metric tons. There were also 3828 metric tons of ferrosilicon and 451 metric tons of silicospiegel produced. The average Swedish blast furnace produces 19.73 metric tons of pig per day.

Lifting Drill Cores

L. C. Harden and Frank Wildeson, of Kimberly, Calif., have patented (U. S. pat. 1,008,904) a core-lifting device shown in the accompanying illustration. The part shown fits within a sleeve between the barrel and the drill, and is made by making an L-shaped slit in a cylinder of metal, and springing part of



Core Lifter

the split portion in, so that it will grip the drill core as it comes up through it into the barrel. The lifter itself does not revolve, but grips the core and remains stationary as the core slides up through it. When the drill is pulled, the core is broken off and comes up with it.

Iron-Coke

A product, "iron-coke," suitable for electrodes, for decolorizing solutions, and for filters, was described by Dr. A. P. Lidoff, of Charkov, Russia, at the International Congress of Applied Chemistry. He passes iron-furnace flue dust repeatedly through magnetic separators, and mixes the magnetic product with gas-coal slack, and cokes under pressure at a high temperature.

Preparing Metallic Vanadium

According to *Journal du Four Electrique*, Oct. 15, 1912, vanadium analyzing over 99% V, has been prepared by reducing V_2O_3 with aluminum, or with vanadium carbide, VC. This is a difficult metal to obtain because of the tendency to form nitride, hydrides and carbides.

Taxation Value of Mineral Rights

By Alfred C. Lane*

The policy of the large land companies of Michigan is to reserve the mineral rights of all land sold. The taxation value of these reserved rights may be determined by the proper consideration of interest and all other charges to which they are subject. The taxation value is but a small fraction of the selling price.

*Professor of geology and mineralogy, Tufts College, Mass.; formerly state geologist of Michigan.

It is the known custom of many of the large land companies of Michigan to sell the timber separate from the soil and in selling the land so thoroughly to reserve the mineral rights and possibilities, other than agricultural, that one might fairly say they sold only the soil. Over this policy there is much grumbling. A homesteader once said of a land agent: "He! Oh, he is the fellow who reserves even the arbutus."

This policy of reservation may go too far. It may happen that the cloud on the title from such restrictive clauses, and the consequent difficulty of borrowing money on the land, is more of a drawback than the very remote value of the rights reserved. Such clauses unquestionably restrict the investment of outside money. Yet there are good grounds so far as they go—I would not say they are sufficient in all cases—for this policy.

Large Tracts Desirable

In the first place it is more economical of all natural resources that they should be mined in units of appropriate size. These are larger than house lots and usually than agricultural units. If the legal unit, such as the western mining claim or the old diamond rights of South Africa, is too small there will be, at first, enormous waste and later consolidation.

In the second place, exploration that is extensive and has only a small chance of success (and such unfortunately are the usual conditions of exploration) will not be undertaken, if, in case of such success, most of the benefit goes to others. The well known result is that where the mining rights go with the land, before mining or drilling for exploration is undertaken, mining rights have to be gathered again into suitable units at the expense of time and money, as well as of royalties afterward. Thus, where there is a reasonable prospect of such rights being worth anything, it is well to reserve them.

Mineral Rights Should Be Taxed

On the other hand, they should not be reserved as a mere matter of form, for in many ways such restrictive clauses prove an annoyance, as I once found when I wanted to borrow money on some village property so restricted. A tax upon them will soon stop this. But how, if we wish independently to assess and tax such mineral rights, shall we value them? The different value put upon them by the owners when it is a question of taxation and when it is a question of organization of a mining company is so great that it reminds one of the story told of a certain Hebrew clothier who told the assessor, who asked him how much stock he had on his counters, that it was worth $10,000, that he paid that much for it and it was worth every cent of it, for prices had gone up since, and he hoped to sell it for $20,000.

When he received his statement he hurried around to the assessor with woe and indignation on his countenance to get his tax abated.

"Why," said the assessor, "I asked you if it was really worth as much as that."

"My God, my God, I am ruined," he cried. "I thought you was the man from Dun's."

And yet, in all fairness, there is really a very great difference between the price at which one will sell mineral rights for a few acres, and the price at which they should be assessed, just as it would be grossly unfair to assess the clothier on the basis of the retail price of each suit. This difference is well brought out in the experience of a friend who was selling a considerable village addition at $100 a lot. The assessor proposed to assess him $100 a lot on the ground that that was the price he was selling for. "Yes," said he, "but I have not got my price yet, though I am asking it, and if you will take the whole of them off my hands, I shall be glad to sell for $50 apiece."

Compound Interest and Other Charges Must be Considered

Property is not worth to a man the price at which he would sell it, or he would not sell it, and the longer he has to hold it until he gets his price, the less it is worth to him now. There is also the further probability that some of the lots will not only be held for a long time, but at the end will be sold for less than the asking price, just as the merchant must figure that a certain percentage of the goods he buys will go into the January mark-down sale.

So let us start with our lots. If my friend could sell one lot a year at $100 and if we discount the price by the interest on his money and the cost of carrying, including taxes, we shall have its worth to him now. The lots sold a year from now would be worth to him, if his money invested otherwise in some business could earn 7% and the taxes and costs of carrying, looking after the land and selling were $4, not quite $90 now. For if he had the $90 now, in a year, with the interest, it would be worth $96.30, and in the meantime he would not have had to pay $4 for taxes and other charges. In other words, he must apply well known principles of insurance, discount and amortization and take the asking price of mineral rights and find out how much of the land per annum can be sold at such asking price, then discount the future payments in proportion and find out by Figs. 1 and 2, the present worth of the whole. Dividing by the number of acres would then give the average value per acre. This seems to me as fair a basis upon which to assess mineral rights as can be devised.

Demand for Mineral Rights May Be Estimated

Of how much land the mineral rights will be annually sold we may find in two ways. We may judge by past experience or we may estimate what will be the output and, from that, determine what amount of land must be developed to keep up the output. The total value may be estimated from an estimated profit per ton, and the estimated annual income; spreading this total value over the total acreage, including producing mines, and subtracting the value of the producing mines and their acreage, we may find the value of the mineral rights of the remainder.

The first of these ways we may illustrate with the aid of facts taken from reports of the St. Mary's Mineral Land Company. In the eleven years since the present organization (1901-11 inclusive), it has sold 4274.66 acres and received in cash and stock $2,673,500.[1] This is an average sale of 389 acres a year at about $690 an acre. A cash price of $500 per acre is not unusual.

If the total receipts are the same in the next eleven years, the company will receive an equal sum, but it will not be worth that to it now. We must discount it. If the taxes and carrying charges were but nominal, we should discount it simply at the rate which money should earn in the land business, say 6 or 7%. But if we are trying to find a value on which it is actually to be taxed, we must

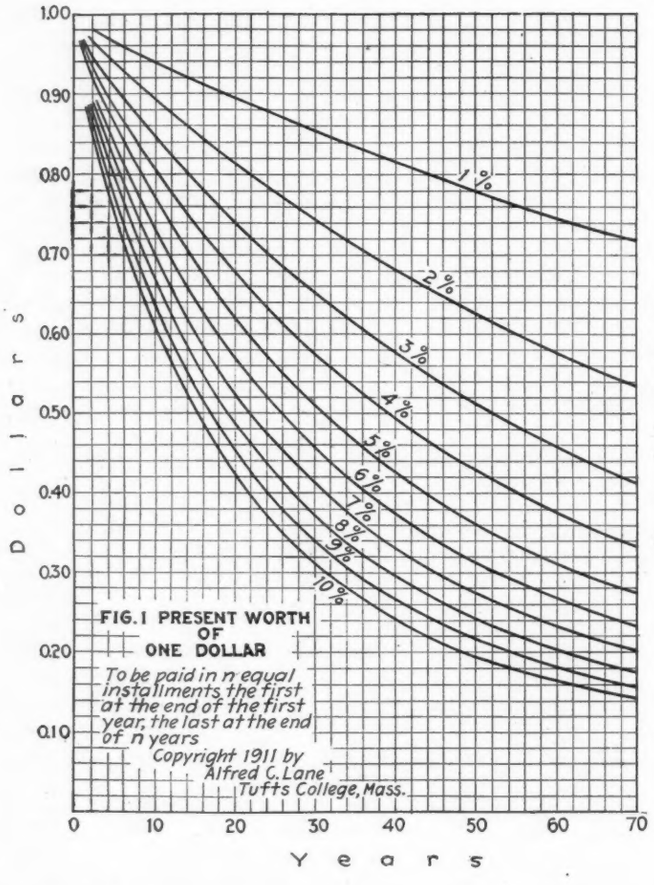
[1]The stock value was figured at the market price.

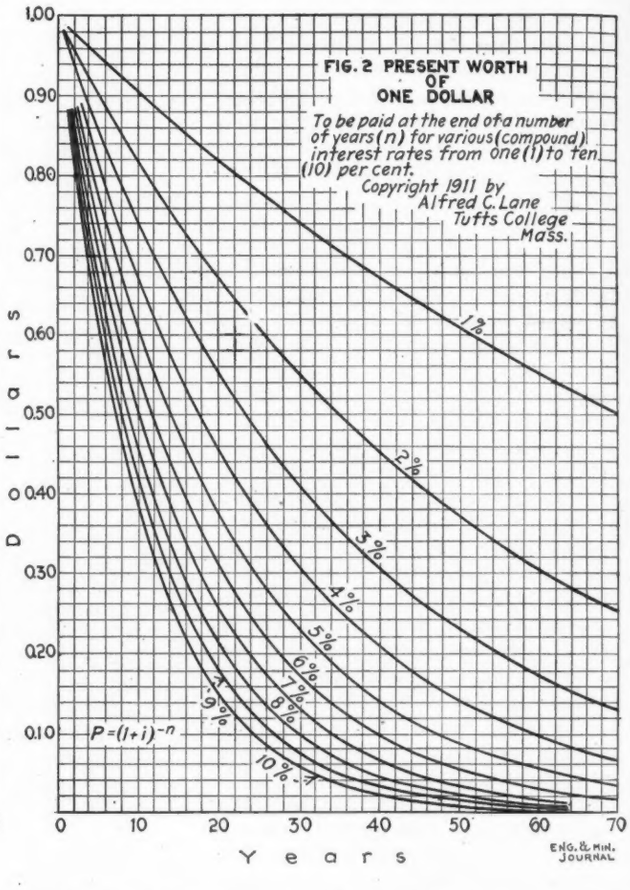
add the tax rate and carrying charges to the interest rate as above shown, which will make a gross rate, by which future returns must be discounted, of near 10% compound interest. For taxes must be paid each year on all that is left.

The present worth will then be, by Fig. 1, but $1,580,000 or 59.04%[2], little over half the selling price. At the end of the eleven years, if we assume that the depreciation in value of the lands remaining, due to picking out the most promising lands is made up by the general increase in land values, there will be another batch of 4274 acres which will then be worth $1,580,000, as the first batch of lands is now, but at present will be worth only 55.05% of that (cf Fig. 2) or say $554,000.

This is as far as our tables go but it is clear that the present worth of all the remaining lands that are held over eighty-eight years before they are sold is relatively insignificant even supposing, which is very unlikely, that they are intrinsically worth as much as the earlier sold lands. The result is, then, that the 93,426.92 acres of land and 14,038.82 mineral rights of the company are worth a little less than two and a half million dollars, assuming that they are taxed, at 3%. If they are taxed for less they are worth more. Whether all the lands of the company above included are on the mineral range is of little consequence so long as there are at least 29,918 acres to which the above calculation may fairly be applied.

The method of finding the rate of exhaustion of copper lands, necessary to keep up the production, furnishes an interesting check, and will also show whether the St. Mary's Mineral Land Co. is selling its land more or less rapidly than the natural progress of the copper industry calls for. From Steven's "Copper Handbook" we can find the output of the Lake mines before 1911. In 1911, it was about 210,000,000 lb., and in 1912 it may be expected to be about 240,000,000 lb. We may expect it to increase at a rate of something like 5 to 8% per annum, if it keeps pace with the growth of the world's production.





PROSPECTIVE VALUE OF MINERAL LANDS.

Value	Acres	When Sold
$1,580,000	4,274	First 11 years
564,000	4,274	Second 11 years
194,000	4,274	Third 11 years
68,000	4,274	Fourth 11 years
23,700	4,274	Fifth 11 years
8,400	4,274	Sixth 11 years
2,800	4,274	Seventh 11 years
$2,430,900	29,918	.....

Proceeding similarly by the same curves, we find the value of the lands of the St. Mary's Mineral Land Co., presented in the accompanying table, if grouped in batches as they will probably come into the market.

[2]Computation by slide rule.

Lands Graded in Value According to Situation

The average present value per acre is, then, only about $25. This is practically the same result as though we supposed the average gross income from sale of lands was kept up indefinitely, that is to say, $243,000 a year. Capitalizing this, at 10%, we find again that it represents $2,430,000. The method first used has two advantages. It is applicable to bodies of land which are likely to be sold in a short time. It also shows how lands may be graded in value, according to their proximity to other mines, and the consequent chances of their being developed, and how small is the improvement in value of lands which are not likely soon to be developed.

A lode 10 ft. wide with 10 lb. of copper per ton will yield from 363,000 lb. of copper per superficial acre upward, increasing with increasing dip—let us say 400,000 lb. of copper per acre. About the minimum that can now be worked without loss is 10 lb. per ton. The average of the lodes worked will probably run close to 20 lb. per ton, for just about half the copper comes from mines whose lodes run over 20 lb. per ton. If we assume that the average lode runs 20 lb. of copper per ton, it will then yield about 800,000 lb. of copper per acre, and the present an-

nual production exhausts 300 acres each year.

Price of Mineral Rights Not Artificial

The total production of Lake copper through 1910, which is 5,122,000,000 lb., will then have exhausted the copper under 64,000 acres of land. The St. Mary's Mineral Land Co. has 107,000 acres of mineral rights, but of these, perhaps, 17,000 may be classed as having no appreciable chance of copper values. We have, then, about 90,000 acres left. The total area of the whole Keweenawan of Michigan, Irving gives as 1744 square miles, but the Lower Keweenawan contains all known lodes except the Nonesuch, and (from certain maps of my own) is but 900 square miles, of which 500 are east of Range 43 and the Porcupine Mountains. In this part alone there are mines and the lands of the St. Mary's Mineral Land Co. lie in this district.

Of this 500 square miles of land, the St. Mary's Mineral Land Co., therefore, controls less than one-third, and it has been selling its land more rapidly than the whole rate called for by the exhaustion due to present production. There is, therefore, no sign that the company is artificially restricting the output by abnormally high prices of land or that decreasing the price asked would increase sales except for speculation, since, in the long run, mines can be developed only as fast as exhausted, allowing, of course, for the full natural development of consumption.

If the other land of the 500 square miles above mentioned was developed for mining property as fast as the land of the St. Mary's Mineral Land Co. is sold, it would mean about 1380 acres per year, or about four times what is exhausted.

If one should draw the inference that only one mine in four is a success, and that only one acre in four of the region in question has a 10-ft. lode with 20 lb. of copper to the ton, the conclusion might not be far from right, although the inference would not be warranted. The correctness of the conclusion is illustrated by the fact that of the 47 Lake Superior copper companies listed by Stevens on p. 1893 (1910-11), only 13 have paid dividends. But as I have said, our right to draw any such inference is entirely doubtful, for the land not owned by the St. Mary's Mineral Land Co. is largely owned by already incorporated mining companies, which prospect here and there, without our being able to make any such sharp line between the idle land and the land which is being developed, as is made in the case of the St. Mary's Mineral Land Co., where practically no land is sold except for immediate development.

It is more likely that we can turn the inference the other way around and infer that the land of the St. Mary's Mineral Land Co. is developed about as fast as the other land, and not notably faster or slower. If so, this would indicate that they were asking a fair price for their land, although, as we have seen, their selling price is so much greater than the average value of their land.

Value of Mineral Rights But a Portion of the Selling Price

If we assume for the dividend or net return per pound of copper that which Stevens says is the average (3.56c.), the average yearly income from all the copper mines, after paying taxes, for a production of 240,000,000 lb., would be $8,500,000. This may gradually increase with an increasing output and will continue for so many years that we practically regard it as a fixed income, as we have found might be taken to be the case for the income of the St. Mary's Mineral Land Co. If we then discount it at 10%, the value of the whole copper range, present mines included, would be $85,000,000. But the income is after taxes are paid. Assuming that no heavier taxes are laid in the future, than in the past (a very doubtful assumption), and using 7% as the interest figure, the total value of the copper mines would then become $120,000,000, and, at 5%, $170,000,000. When we subtract the value of the going mines, we shall have but little left for the value of the mineral rights. In fact, if we take the stock-market quotations of the various listed companies, we should have nothing at all. As I have elsewhere shown, these quotations always give the value far above the value of the mine, from an income-producing point of view.

The conclusion of the whole matter is this: that mineral rights have a value which is but a small fraction of the selling price. It is possible to determine an average value for them which may be called the taxation value. The actual return to a given small holder of a small area of mineral rights will depend partly upon its accessibility but largely upon the ability of himself or his neighbors to hustle and get his tract developed sooner than the tract of someone else. This personal ability is a thing which the state cannot foresee nor tax.

The same principles which have been outlined here can be applied to the iron-mining ranges, and the data so carefully collected by Doctor Leith, provided that we assume that the output of the ranges will, as has been suggested, keep up for a reasonable length of time, at the present rate.

A 25-cycle single-phase Kjellin induction furnace has been installed by Deere & Co., of Moline, Ill., for the purpose of making special steel of steel scrap from cuttings of rods.

Copper Mining in Argentina

By C. A. Tupper*

The copper-mining industry of Argentina can hardly be said thus far to have passed beyond the earliest stages of development; nor has exploration been extensive; but enough has already been done to reveal the existence of ore deposits which will eventually be a factor of importance in the world's production.

Main Operations Near Chilecito

Present operations are chiefly centered in the districts near Chilecito, Province of Rioja, which is the lower terminus of the 22-mile Bleichert aërial tramway, built by the Argentine Government. The districts here are known as La Mejicana, El Ofir, Los Bayos, La Encrucijada, Santa Rosa, and La Parrayo.

The Mejicana district lies at an altitude of 14,800 ft. and is reached from station No. 9 of the government aërial tramway. Its geology has many interesting features. The principal formation is a highly metamorphosed Paleozoic slate, with limestone intercalated. Other rocks are tuffs, sandstone, ancient conglomerate, carbonaceous schist and recent conglomerate. The eruptive rocks are represented by granite, porphyry, pegmatite, dacite, diorite and greenstone. Similar formations characterize the other districts mentioned. The strike and dip of the veins are variable.

At the surface complex ores are encountered, with concentration and enrichment. Chalcopyrite similar to that of Shasta County, California, although not as rich, is the predominant ore in depth, mixed in places with enargite, including an antimonial variety known locally as "famatinite" from the Famatina Mountains in which the mines are situated. Pyrite, galena, blende, etc., are also found in large quantities. The matrix is mainly quartz, with some calcite and barite. The copper content ranges from about 4% in the upper mines, at Upulungos, to 14% at San Pedro, with sulphur content from 26 to 34%, silica 16 to 38% and iron 18 to 20%. Gold, silver, zinc and alumina are also present in quantities, the gold averaging 1.3 oz. and silver 71 oz. per ton. Of the remaining content from 5 to 6.5% is accounted for by lead, nickel, zinc arsenic, antimony, magnesia, bismuth and lime, and by barite in about the same proportion as the total of these elements. Of moisture there is only a trace. The heaviest deposits are near the surface.

The principal mines here have been acquired by the Famatina Development Corporation, Ltd., of London, England and its subsidiary, the Forastera Mines, Ltd., the two together being known locally as "The Syndicate."

*Consulting engineer, 389 Thirty-first Avenue, Milwaukee, Wis.

The supply of labor has, in general, been found sufficient, difficulties anticipated in respect to this not having materialized. The most efficient miners are Chileans, and they will probably be the best permanent source of future supply. At the beginning of systematic development work they demanded and obtained housing and other accommodations superior to those of the native element. The grade of Argentine labor has, however, been raised.

The lodes are not wide, ranging from about one to six feet, or an average of about four feet, and one of the greatest difficulties encountered by the management has been to teach the miners to narrow their stopes, so as to avoid breaking out an undue proportion of wall rock. Sorting will, however, have to be more carefully done as operations increase, for the reason that transportation of waste, mixed with good ore, is too costly.

Operations in the Mejicana district will be greatly facilitated by the introduction of electric power at the mines, and several sites for hydro-electric plants have been located, one or more of which will be developed in the near future. Present hand work, owing to the low efficiency of hand labor at such high altitudes, is slow and costly; so that with electric power an appreciable economy can be effected.

El Ofir Mines Undeveloped

Within 1½ miles of the tramway terminal at Upulungos, and about 540 ft. lower, are El Ofir mines, which are still comparatively undeveloped. The lodes dip 50 to 60° and are composed of quartz, with pyrite and chalcopyrite and some gold and silver. The copper content, as thus far revealed, does not run above 8% but further exploration may show better grade. This is a contact zone of slate with a granite and porphyritic mass, the latter being separated from the granite of the higher ranges by bands of red sandstone and conglomerates.

About 1600 ft. farther down the mountain range and in the vicinity of station No. 8 of the government tramway, is the district of Los Bayos, the principal operator in which has thus far been the Compañia Minera Los Bayos. The surface rock is dacite, broken by eruptions of porphyry, which resulted in the formation of numerous fissure veins. The fissures are filled partly with decomposed rock, or *tofo* and partly with ore. The ore is composed of tetrahedrite and enargite, with pyrite and chalcopyrite in the lower levels. Quartz and barite form the matrix. The ore occurs as inclusions in the gangue or as small concretionary masses. It yields, on an average, about 3% copper and a high percentage of silver.

Seven miles from the mines of the Famatina Development Corporation, at an altitude of 10,000 ft., is the Encrucijada district, where the ores are chalcopyrite, bornite, chalcocite and covellite, each of which carries silver. The gangue is argillaceous. The primary formation is Paleozoic slate. Parallel with the copper-bearing lodes are bands of green magnesite, with inclusions of pyrite. Some mining has been done here by natives and a small smeltery for reducing the ore to a first matte is intermittently operated.

In approximately the same altitude but farther to the northeast, or 18 to 23 miles from Chilecito, are the Santa Rosa and Pararrayo districts, the principal mines of which belong to the Rio Amarillo Copper Mining Co., with a smelting works at Totoral. Chalcopyrite and chalcocite are the chief ores, with surface occurrence of malachite and iron oxides. The figures and other data used in this article have been taken in part from a comprehensive report prepared for the Argentine government by Pablo Viteau, national inspector of mines.

Famatina Corporation Active

The most important and promising operations in this section are undoubtedly those of the Famatina Development Corporation, above mentioned, which was originally organized as the Famatina Copper and Gold Syndicate, Ltd., and reorganized in 1903 under its present style with $3,500,000 authorized capital. Besides the two principal groups of mines at Upulungos and San Pedro, there are the Esperanza, Placilla, Andueza and Verdeona. The company's concessions cover more than 800 acres, extending over two miles. Development is by adits or tunnels, several of large extent having been opened up. From these winzes and raises are driven.

A 200-ton smeltery has been built at Santa Florentina, near Chilecito, reached by a branch line from station No. 2 of the tramway, or Durazno. The first furnace was started in the summer of 1908 and a second erected during the following year, together with a stand of converters. For calcining there is a Brown mechanical roasting furnace. It is proposed to do some heap roasting when enough ore is regularly produced to keep the smeltery running to capacity, as under that condition the Brown furnace will not be sufficient. Two 18-ft. 6-hearth roasting furnaces of the McDougal type, similar to those used by the Cerro de Pasco company in Peru, have been ordered.

There is also a Yeadon briquetting plant in which the fine flue dust from the smelting works is mixed with roasted ore, slaked lime being added as a binder. Flux is obtained from a near-by limestone quarry, with some brought in from Cordoba, and the company has a sufficient supply of quartz on its own properties. Assays of regulus from the smeltery showed 61.24% copper, 255.3 oz. silver and 4.7 oz. gold per ton. Since April, 1911, however, all of the product has been in the form of blister copper. To avoid losses of copper and precious metals in the escape of dust and fumes, further improvements in the plant will be made, including new flues and settling chambers. Recent smelting has averaged about 3000 tons monthly.

Fuel Scarce

The greatest obstacle to be overcome in smelting ore anywhere in Argentina is the lack of suitable fuel. No anthracite or good coking coal has thus far been discovered and the beds of lignite found in certain localities are unsuitable for furnaces. Thus far coke has had to be brought from Europe, via Buenos Aires. The principal hope of the future seems to lie in some method of electric smelting, with current transmitted from water power back in the Andes.

Power for the mechanical operations at the smelting plant is obtained from a small hydro-electric development, with steam auxiliary. This cannot be greatly enlarged but other power sites, as above cited, have been located between the works and the mines.

Outside of the Chilecito or "Famatina" section, copper deposits have been found in the provinces of Catamarca, Mendoza, Neuquen, Salta and near Candelaria and Santa Anna.

Some of these deposits are being worked on a minor scale; but the aggregate production will probably continue small until the problems of transportation, fuel and skilled labor have been more effectively solved. The most encouraging reports should come, in the immediate future, from the Famatina Development Corporation. As explained in the articles describing the aërial tramway the operations of the company were seriously interfered with by failure of the government to provide the necessary facilities for keeping the line in continuous service; but this condition appears to have been remedied, and the current year should show a much larger production than any preceding.

Mineral Production of India

The mineral output of British India for 1911 is officially reported as follows: Coal, 12,048,726 tons; mica, 31,686 cwt.; manganese ore, 441,426 tons; gems, 288,216 carats; gold, 8277 oz.; samarskite, 24 cwt. It is also mentioned that there were increases in production in limestone, copper, iron, salt, slate, wolframite, fuller's earth, galena, graphite, chromite and tin, but no figures are given. There were 146,336 persons employed, of whom 93,656 work underground, and 52,680 on the surface. The adult males numbered 92,048; adult females, 48,971; and 5317 were children under 12 years.

Requirements of Glass Sand

Sand is the main constituent of glass, constituting from 62 to 65% of the original mixture, or from 60 to 75% of the finished product after melting has driven off carbon dioxide and other volatile materials. On the quality of the sand depend the transparency, brilliancy, and hardness of the glass, says the U. S. Geological Survey. For the finest flint ware, such as that used for optical and cut glass, "water whiteness," absolute transparency, great brilliance, and uniform density are required, and only the purest sand can be employed, since slight impurities, especially small quantities of iron, tend to destroy these effects.

For plate and window glass, which are commonly pale green, absolute purity is not so essential, but generally the sand should not carry more than 0.2% of iron oxide. Green and amber glass for bottles, jars, etc., can be made from sand relatively high in impurities. An excess of the chief impurity, iron, is usually avoided in the quarries by a careful selection of the whitest sand, although the whitest sand is not invariably the purest. Repeated washing tends to remove the iron. Magnetic separators also have been resorted to, especially when the iron is present in the form of magnetite.

Clay materials are objectionable because they cloud the glass. Washing helps to remove them, since they occur usually in a very finely divided state. Magnesia, which is more apt to be introduced into glass materials through limestone than through sand, is troublesome because it renders the batch less fusible.

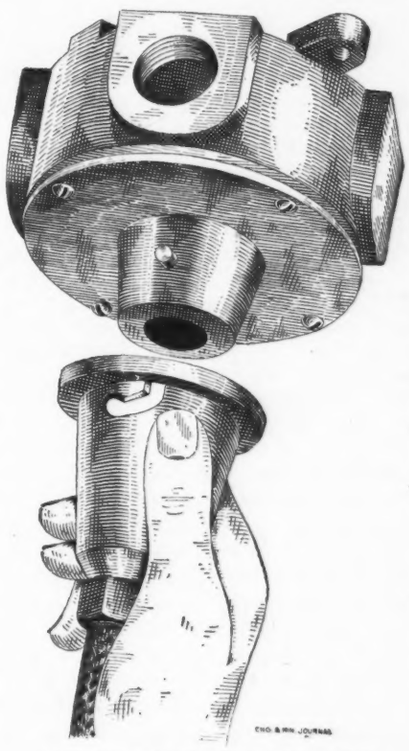
In examining sand in order to ascertain its value for glass making, inspection with a magnifying glass is the best preliminary test. The following points should be observed: The sand should be nearly white and of medium fineness (passing a 20- to 50-mesh horizontal sieve); the grains should be uniform in size, even, and angular; less preferably they may be rounded. A simple chemical test consists in heating the sand in a dilute acid. Effervescence indicates the presence of lime; loss of color shows the presence of clay impurities. Iron in minute quantity may be detected by dissolving sand in hydrofluoric acid and adding potassium ferrocyanide, which produces a blue precipitate if iron is present. Complete quantitative analyses as well as a furnace test should be made as a final determination of the character of a prospective glass sand before its use is attempted.

Pennsylvania produces 30% of the sand used in glassmaking in the United States—about 400,000 tons. The average value of glass sand in Pennsylvania is $1.40 per ton.

Conlan Watertight Electrical Connection

The electrical plug and receptacle shown in the accompanying illustration is being introduced by the Conlan Electric Co., 43 Murray street, New York, to meet the need for an automatic watertight receptacle which does not require the operator to do more than make the electrical connections.

Among the points claimed by the manufacturer are these: Electrical connection cannot be made without making the device watertight, and the receptacle cannot be left nonwatertight. The plug is locked into position by a push and a single turn, therefore no switch is needed, as a quick make and break can be made. The receptacle is mounted on the cover, independent of the outlet box. No cover is used, and no threads are employed. All metal parts are of heavy brass and bronze. The receptacle is of porcelain; the plug and valve of heat-resisting insulating material.



CONLAN WATERPROOF ELECTRICAL CONNECTION

Wash for Removing Black Drawing Ink

A wash for removing black drawing ink from tracing cloth has been recently put on the market by William G. Bond, Wilmington, Del. The wash does not injure the cloth and gives good results where the surface has not been injured by rubber erasures, pen cuts, etc. After the surface of the cloth, where the ink is to be removed, has been dampened for two or three minutes with the preparation, called "Inkwash," the ink can be readily wiped off with a moist cloth and the surface of the tracing cloth polished with a soft dry cloth.

Mining in Chosen

The gold mines of Chosen have long been one of the chief sources of national wealth and during the last two years, according to a British diplomatic and consular report by Consul-General Bonar, a slight increase in the output has taken place. Exports of gold bullion have risen from, roughly, $4,509,000 in 1910 to $4,625,000 in 1911.

Although a large portion of the stock is owned by British subjects, the principal companies are American corporations, and include: Oriental Consolidated Mining Co., Wunsan, capital $5,000,000. This company has been working for 13 years and in 1911 paid a dividend of 15%. Chikusan Gold Mining Co., Chikusan, capital $1,000,000. The new flotation of this company provides for a Japanese holding of 24% in the stock. Seoul Mining Company, Suwan, capital $500,000. This company commenced work in 1909. A dividend of 45% was paid in 1911. Chosen Mining Co., Kosurg, capital $510,000. This is a new company which was floated in 1911.

Chosen is regarded as a promising field with resources barely touched, and there are now signs that owners of large mining enterprises in Japan are prepared to work gold and other mines in this country.

Iron-mining operations have hitherto been confined to the neighborhood of Chinnampo, but deposits of iron ore are reported in varying quantities all over the peninsula. Facilities for communication and transport are desirable to insure developments. At present the only mines of importance being worked are at Inritsu, Sainei and Angaku. The first two are controlled by the Japanese government iron foundry at Wakamatsu, and the third is a private concern selling all its ore to the Wakamatsu foundry.

The consul-general reports, however, that recently the Mitsui Bishi Co. purchased iron mines, 1470 acres in extent, and applied for permission to work another mine 792 acres in area. The Mitsui company intends to work iron mines with an aggregate area of 3054 acres, and Okura & Co. have applied for permission to work an iron mine 41 acres in area.

The consul adds that the reserves of capital possessed by these companies augur well for the future prosperity of the industry, and with the extension of railway communication iron mining should assume a high place among the sources of wealth in Chosen.

PERSONALS

Mining and metallurgical engineers are invited to keep The Engineering and Mining Journal informed of their movements and appointments.

Frederick P. Burrall has returned to New York, after spending two months in Alaska.

Samuel A. Benner, assistant to the president of the Pittsburgh Steel Co. for the last two years, has resigned.

H. Kenyon Burch, after spending a few days in Los Angeles, Calif., left there Oct. 28, on his way to Globe, Arizona.

R. H. Flaherty, of Port Arthur, Ont., has returned from an exploration of Ungava district, in the interest of Mackenzie & Mann.

Charles A. Gibbons, Jr., has been appointed superintendent of mines for the Central Chile Copper Cor., to succeed J. W. Maxwell, who will leave the employ of the company Jan. 1 next.

Dr. J. A. Holmes, chief of the Bureau of Mines, sailed from New York, Nov. 2, for Panama, where he will make some investigations of fuel questions affecting the supply of the canal works.

L. A. Phillips, assistant general manager of the Refining & Producing Oil Co., of San Francisco, has been elected general manager and vice-president of the corporation, succeeding the late Henry J. Crocker.

Joseph Thorpe has been appointed assistant general superintendent of the Pennsylvania Coal & Coke Co., with headquarters at Cresson, Penn. He was superintendent of the Nanty-Glo mines of the company.

R. E. Hesler has been appointed chief engineer of the Indiana division of the Rochester & Pittsburgh Coal & Iron Co., with headquarters at Indiana, Penn. He was formerly with the Morrisdale Coal Co. as chief engineer.

J. B. Tyrrell, mining engineer, of Toronto, has returned to that city after having spent five months on the shores of Hudson Bay and in the country between Hudson Bay and the new railroad line of the Grand Trunk Pacific.

By a reconstruction of the Canadian administration, Hon. Louis Coderre, M. P. for Hochelaga, Que., becomes Secretary of State and head of the Department of Mines, which has been transferred from the Minister of the Interior to the Secretary of State.

M. J. Butler has resigned his position as general manager of the Dominion Steel Corporation. No successor will be appointed, the duties being divided between other officials. D. H. McDougall, assistant general manager of the Dominion Coal Co., becomes general manager of that company.

Van H. Manning, of the U. S. Bureau of Mines, made a recent visit to San Francisco and continued on to Denver by way of Los Angeles. The bureau is establishing a laboratory at Denver, and Mr. Manning stopped at San Francisco to confer with Dr. Cottrell's office regarding necessary equipment to be placed at Denver.

Thomas X. Fitzgerald, formerly superintendent of the Tudor works of the Republic Iron & Steel Co., at East St. Louis, Ill., and since July 1 superintendent of the Mahoning Valley works, Youngstown, Ohio, of the same company, has been appointed general labor foreman by the general superintendent, Oscar Black. He succeeds M. J. Regan, who has been made superintendent of the Hannah furnace, Youngstown.

T. Inouye and T. Nakamura, mining engineers of Japan, have recently been visiting important mining properties in California, including the Mammoth copper mine in Shasta County, La Grange hydraulic mine in Trinity County, and the Noble Electric Steel Co.'s iron smelter at Heroult, Shasta County. Mr. Inouye is professor of mining in the Imperial University, and Mr. Nakamura is manager of coal mines in the southern part of Manchuria. The purpose of their visit has been to study the methods of mining, milling and smelting in California. They also visited some of the dredging fields. They came to America by way of Siberia and Europe and, returning, left San Francisco, going direct to Japan.

OBITUARY

Sidney H. Newbury died at Pittsburgh, Oct. 29, aged 48 years. He was born in Wales but went to Pittsburgh when a boy and entered a steel mill there. He had been for some years with the Crucible Steel Co., as superintendent of its open-hearth furnaces.

James S. Burgess died at Wilson, N. Y., Oct. 13, aged 68 years. He was born in New York, and went to Colorado when a young man. He was prominent as a miner and operator at Leadville in the earlier days of that camp, but retired on account of injuries received in an accident.

S. C. Beebe died at Butte, Mont., Oct. 18, aged 77 years. He was born in New York, but went to Montana when 19 years old, with the pioneers of that state. After an early experience in mining, he engaged in the construction of mills and smelting works and was employed in Montana, Idaho, Nevada and Washington. He directed the construction of mills at the Cable, Blue Bird, Bimetallic and other well known mines. It was claimed for him that he set the first timbers in the shaft of the Anaconda mine, and built the first smelting works at Anaconda. He leaves three sons, all engaged in the same business as their father.

Prof. Thomas Price died at San Francisco, Oct. 13, aged 77 years. He was widely known throughout the West as a mining engineer and metallurgist. He went to San Francisco from Swansea, Wales, in 1862. His was a very active career, and his professional duties called him, at one time or another, into all the Pacific Coast states and territories; to Colorado, Montana and Mexico, and even as far East as North Carolina. Professor Price came to the United States, originally, to purchase copper ores for shipment to Swansea, and for a number of years conducted that business on a very large scale. He erected, at Antioch, Calif., in 1864, the first copper-smelting plant in the West. The first plant of the Selby Smelting & Lead Co. was built from his plans and under his direction, his Swansea experience giving him a knowledge of the metallurgy of lead, which, at that time, was unique on the Pacific Coast. He was well known to a large number of friends, who will learn with great regret of his death. He was of a lovable, genial character, and while his scientific attainments were large, he was the most modest of men. The hydrated borate of lime, known as "priceite," was first shown by him to be a new mineral, and was so named by Professor Sullivan, of Yale, who confirmed Professor Price's original work.

Societies and Technical Schools

American Institute of Mining Engineers—The annual meeting of the New York Section will be held at the Engineering Societies Building, Nov. 22. A paper on "The Structure of the Northern Anthracite Basin Relative to Forms of Folds," by Nelson H. Darton, of the Bureau of Mines will be read.

Old Freibergers in America—A meeting of old students of the Freiberg Bergakademie will be held on Friday, Dec. 20, at 7 p.m., in the Hofbräu Haus, Broadway and 30th St., New York. Old Freibergers are requested to send their names and addresses, with those of any others they may know, to C. L. Bryden, 1015 Myrtle St., Scranton, Penn., secretary.

American Society of Mechanical Engineers—The annual meeting will be held in New York, Dec. 3-6 next. The meeting this year will comprise sessions upon a greater variety of topics than have ever been arranged for a meeting. No less than 10 sessions are contemplated, with papers grouped to form symposiums upon various subjects. This broadening of the society's work is the result of the subcommittees lately appointed under the direction of the committee on meetings. The publication of the papers for the annual meeting began in the September number of the *Journal*. The last will appear in the December number or be printed in pamphlet form for distribution at the meeting.

Editorial Correspondence

From our Representatives at Important Mining Centers

San Francisco

Oct. 30—The recent ruling of the General Land Office regarding mineral land, which holds that mineral found in surface rock alone will not amount to a discovery unless it contain ore in paying quantities, has created much uneasiness among prospectors and locators in California. The Prospectors Alliance of America, organized at Bishop, Inyo County, about one year ago, has taken the matter seriously and will hold a meeting at San Francisco in December for opposing the ruling and offering some suggestions as to the revision of the mining laws. The organization has grown and gradually extended its influence to other counties in California and Nevada, and it is expected that the meeting will be largely attended. The ruling of the land office is particularly unfortunate in its effect upon the mining industry in California at present. The last summer has been an active season in prospecting and locating new mining claims, and a poor season for wildcatters and unreliable promoters. If the purpose of the ruling is solely to discourage the promoters it will fail in this state, for the promoter, if allowed to operate at all, is as competent to swindle the stock purchaser with the promotion of a developed mine as with a new claim; in fact the opportunities are greater in the promotion of partially developed mines or the reopening of old producing mines than in the exploiting of new claims. If the purpose is to discourage the prospector and conserve the timber at the sacrifice of the mining industry the purpose will be fairly well accomplished unless the miners act concertedly and promptly. The ruling of the land office further holds that discovery of mineral cannot be claimed simply because surface indications, combined with geological inference, indicate that other and unconnected veins or lodes lie at greater depth; and that there must be a vein or lode of quartz or other rock in place carrying gold or some other valuable mineral deposit. To the miner, the ruling appears dangerous to the prosperity of the mining industry in California, and the effects may not be easily overcome.

It is reported that there is scarcity of labor in the mining districts of northern California, particularly in Sierra County. The Alaska, the Sierra Buttes, and others of the larger mines are in need of more men. The mines at Alleghany, Forest and Plumbago have about the usual complement of men for winter work, but there are no idle men.

Denver

Nov. 2—The fate of a great engineering project hangs on the results of the election of Nov. 5, when the people of Colorado will vote on the Moffat tunnel bonds. This is an act to promote and increase the general prosperity of the state by driving a tunnel through the base of James Peak. This act provides that the state shall loan its credit to the amount of $4,000,000, 50-year, 4% bonds to assist in building the tunnel. The Denver, Northwestern & Pacific R.R. is operated over the top of the main continental divide at an altitude of 11,600 ft., and it has been found that it cannot be operated profitably over 23 miles of 4% grade above timberline, which has prevented the road being financed so as to build westward from its present terminus at Steamboat Springs on the eastern edge of the Yampa coal field, to Salt Lake City as originally intended. Newman Erb has agreed to build this extension if the people of the state will pass the tunnel bill, and guarantees the payment of the principal and interest on the bonds, the railway giving security based on its entire boldings to this end. The tunnel will be of such immense benefit to the state and to Denver and Mr. Erb's offer is such an eminently fair one, that the bill should be carried unanimously, but it is feared that it has no chance, owing to the ignorance of the mass of voters, and in the fact that it has been made a more or less political, personal, sectional and railway opposition issue. The educational campaign which was started about two weeks ago should have been begun three months ago.

According to reports given out by the various plants treating the gold ores from the Cripple Creek district, the October output was 75,486 tons of a gross value of $1,182,953. Part of the report here given is interesting as showing the extraordinarily low-grade ores that are now being treated.

Mills	Tons	Assay	Total value
Portland	16,240	$2.23	$52,445
Stratton's Independence	10,591	2.92	30,725
Kavanaugh	1,700	2.20	3,740
Gaylord	1,400	3.50	4,900
Isabella	750	1.50	1,125
	30,681	$3.29	92,935

Butte

Oct. 30—At the Pennsylvania mine of the Anaconda Copper Mining Co., the main shaft has reached a depth of more than 2000 ft., and will be continued to the 2400-ft. level. A station is being cut on the 2000-ft. level, where exploration work will be started. The work of changing the hoist from steam to compressed air was completed near the end of September, and on Oct. 1 operations were resumed at full capacity. There are 460 men on the payroll and about 500 tons of ore is being hoisted daily, this amount being smaller than usual, due to the large amount of development being done. The work of driving the south crosscut on the 1800-ft. level was temporarily suspended recently, after a distance of approximately 2100 ft. from the shaft had been attained, and the miners working there began to drift west on a small stringer of ore, which was passed through about 200 ft. back from the present face. Retimbering of the air shaft three-compartments wide from the 1400-ft. level to the surface, which has been progressing for several months, has reached a place midway between the 500- and 400-ft. levels. This leaves about 450 ft. of shaft still to be timbered, and which should be completed in four months or less. At this time, a first-motion hoist, operating two double-deck cages, will be installed, and ore from the western portion of the mine hoisted, thus considerably increasing the mine's output, while at the same time the increased width of the shaft will augment the amount of fresh air now passing through the workings of the mine.

No. 1 shaft of the Leonard mine, which is now used principally for lowering timbers and supplies, has been sunk to the 2000-ft. level, where a station has been cut and crosscutting commenced. The No. 2 shaft, which is the main hoisting shaft, is being sunk, three-compartments wide,, to the 2200-ft. level, and is about 2100 ft. deep. On the 1400-ft. level, a crosscut has been driven under the East Colusa shaft, and the work of raising 500 ft. to connect with that shaft at the 900-ft. level, has been commenced.

At the West Colusa mine, the hoisting engine is being altered to admit of hoisting with compressed air in the future instead of steam. This work has been going on for more than a month, and during this time a force of men has been engaged in retimbering the shaft. Until recently, a limited amount of mining was

being done, and the ore hoisted in equal amounts by the Mountain View and Leonard mines, but all mining has now ceased and will not be resumed until the shaft has been fully repaired and the compressed-air hoisting system installed.

At the Mountain View mine, the air shaft is being newly timbered from the 600-ft. level to the surface. The work has reached a point a short distance above the 300-ft. level. Due to the fact that the upper levels of the mine are constantly settling and moving slightly to the east and south, it has been decided to place a jacket about the shaft from the 300-ft. level to the surface, and as this work is necessarily very slow, it will probably be about four months before the shaft is in commission again, as the distance from the 300-ft. level to the surface at this point is about 500 feet.

Salt Lake City

Oct. 31—The situation at Bingham remains unchanged. The Utah Copper Co., it is reported, is working about 1500 men, exclusive of deputies. Blasting was resumed Oct. 27, and more than 12,000 tons of ore was mined and shipped. Fifteen steam shovels are in operation, and work is being done on practically all levels. A night shift was put on, Oct. 24, for the first time since the strike. Some Mexican laborers have been brought in, and it is said to be the policy of the management to eliminate Greek labor. The statement that any negotiations have been entered into by the company with the Western Federation of Miners is authoritatively denied. Some old employees, boiler men, machinists, etc., have returned to work for the company. Conditions are approaching normal, and an average of about 10,000 tons of ore daily is being mined. Nine sections of the Arthur mill and eight sections of the Magna plant are being operated. The September copper production was 6,965,144 lb. At the Utah Consolidated 130 men were at work Oct. 24, and 500 tons of ore was mined. The working forces have since been increased to 150 men. The aërial tramway to Tooele is being operated intermittently. Other mines are gradually resuming operations and increasing forces; the Yampa, Bingham-Montana, Silver Shield, and one or two smaller properties are the only mines that have not yet resumed. Miners and deputies going to work in Upper Bingham cañon, Oct. 25, were fired on from ambush by strikers, and a deputy sheriff and three men were injured. The men who did the shooting are believed to have escaped over the range toward Pine cañon on the Tooele side, and are being looked for by an armed posse of 20 men. A reward of $2000 has been offered. This shooting, it is thought, may have been caused by personal differences among some of the foreigners, Greeks, Italians, etc., and does not reflect the actual conditions. At the Ohio Copper 24 men are at work underground, and a night shift will soon be added. Ten trains of 18 cars each, or about 900 tons of ore, were sent out to the concentrator at Lark, Oct. 24. Three shifts are being worked here, operating two units; 78 men, or about 60% of the normal working force, is employed. At the mines of the Utah Apex Mining Co. 40 men are working, and up to 70 tons of lead ore daily has been shipped to the smeltery at Murray.

Deadwood, S. D.

Oct. 25—In a case tried before Judge W. G. Rice, of the circuit court of Lawrence County, the assessed valuation of the Golden Reward properties, at Terry, was reduced to the original valuation returned by the assessor. The county commissioners had previously raised the assessment 175%. This is not the end of the case, however, as the court has under advisement the matter of making a new assessment, and raising the valuation materially. The judgment of the court was based upon the fact that the commissioners had ordered the raise of assessment at a time after their session should have expired. Under the law of South Dakota, the sessions of boards of county commissioners are limited to 15 days in each month; the judge held that this means 15 calendar days, while the board had sat for 15 working days, which at this particular session included a holiday and two Sundays, and their action on the assessment had taken place after the 15th. of the month. There is a likelihood that this case may result in all property being assessed at full valuation, instead of one-third, as has been the practice in the past.

Toronto

Nov. 1—The five-months period during which the duty on imported cement was reduced by half on account of a short supply in western Canada, expired today and no further action will be taken by the government until the meeting of parliament. The effect of the reduction was a great increase in cement importations. During the four months from June to September inclusive, the imports for the whole of Canada were 793,656 bbl. as against 327,439 bbl. for the corresponding months of 1911, and the imports into the provinces of Manitoba, Saskatchewan and Alberta amounted to 302,450 bbl., as against 3191 bbl. As the building season in the west is nearly over with large supplies of cement on hand, the urgency which prompted the action of the government is now at an end. F. P. Jones, general manager of the Canada Cement Co., states that the reimposition of the original duty of 52c. per bbl. will not cause any change in prices.

Chihuahua

Oct. 27—Depredations by marauding bands of rebels have greatly harassed operations throughout the states of Chihuahua and Durango for practically the entire month of October. Lately, however, the government troops have shown more energy in pursuit of these bands and more vindictiveness in the punishment of the captured leaders. Verified reports from the western part of the state have reached this city stating that several of the more dangerous bandits have been hung from convenient trees and left hanging there as a warning to others.

On the night of Oct. 22, a band of rebels visited the camp of Terrazas, 25 miles north of Chihuahua, robbed the Rio Tinto Copper Co's. safe of about 4000 pesos, looted the store and cut off the water supply so that the smelting plant was forced to shut down. Several of the Mexican and foreign employees were also robbed. The bandits escaped before the arrival of federal troops. This property is owned and operated by the Corrigan-McKinney company of Cleveland, Ohio. The same interests suffered loss about three weeks previous when their Concheño mine in the western part of the state was similarly looted by rebels. The Mapimi camp in the state of Durango was also visited by bandit rebels recently, but the Peñoles Mining Co., the chief operator, was a small loser on account of the timely arrival of government troops.

Owing to these and other molestations a number of companies have postponed resumption of work, while many have been obliged to reduce their output on account of the dangers attendant upon the marketing of bullion over bandit-infested trails. Another serious drawback has been the disturbed railroad traffic. For the latter half of the month the Mexico Northwestern Ry. discontinued service on its line between Casas Grandes and El Paso, while the National Ry. suffered from the destruction of part of its lately repaired line from El Paso south. The Orient line was inoperative on both its eastern and western branches out of Chihuahua for most of the month. The National line south of Chihuahua has been open most of the time so that supplies were brought in, as was sufficient fuel to insure several weeks' operation of the Chihuahua smeltery.

Several of the outlying properties in the near by Santa Eulalia camp were looted, but the losses were small. No reports have come in mentioning personal injury to any foreigner at the mines, although two American cattlemen were seized and caused to pay ransom for their liberty. It is not likely that any of the companies now operating will be forced to suspend as long as the railroad line south is kept open.

The Mining News

The Current History of Mining

Alaska

The Yukon Gold Co. sent $552,000 in gold bullion from the mines to the Seattle Assay Office Oct. 29, via steamer "Humboldt."

J. T. McGriff, of Fairbanks, contemplates building a dredge on his Deadwood Creek property in the spring.

Alaska-Mexican—During September the mill was in operation 30 days, crushing 19,593 tons of ore for a recovery of $54,360 in gold and concentrates. The estimated net profit is $23,296; the yield $2.80 per ton of ore milled.

Alaska-United—During September, 17,990 tons of ore was crushed in the Ready Bullion mill, and 19,656 tons in the 700-Ft. Claim mill. The recovery in gold and concentrates was $59,123, and $52,274 for the two mills; the estimated net profits are $30,465 and $21,869. The yield from Ready Bullion ore was $2.89; that from 700-Ft. Claim was $3.82 per ton of ore milled.

Alaska-Treadwell Gold Mining Co.—During September, the mill was in operation 30 days, crushing 79,436 tons of ore, from which $176,121 in gold was recovered in bullion and concentrates. The estimated net profit was $78,510; the yield $2.24 per ton of ore milled.

Arizona

Mohave County

Loper and Carney—It is reported that Ralph H. Cameron has taken a bond on these properties, which are about eight miles east of Hackberry, in the Cottonwood district. The owners have been asking $50,000 for the claims.

Midnight—Kean St. Charles is shipping machinery for a concentrating plant to this mine, at Chloride. Mr. St. Charles has been developing the property for several years and has much copper, lead and zinc ore blocked out.

Arizona-Southwestern Copper Co.—The new mill, at Copperville, is nearly completed, and the work in the mine preparatory to stoping ore is being rushed so that the mill will probably be in operation within the next few weeks.

Nevada-Arizona—J. F. Wallace has completed his contract for driving the Roosevelt tunnel at these gold mines in the Music Mountains. This tunnel was driven 730 ft. along the vein to connect with the Mohawk shaft, and it is stated that about 700 ft. of this distance is in good milling ore. Near the shaft and on the Mohawk vein ore was encountered, which assayed over $100 per ton. A contract is to be let to sink the main shaft on the Lucknow claim at least 200 ft. deeper. The bottom of this shaft will then be below the old stopes, and it is also expected that the available water supply will be greatly increased. The machinery for the new mill has been on the ground for some time, but construction has been delayed by waiting for lumber, which is now *en route* from the coast. A loading platform is to be built on the Sante Fé railroad, at Antares, where a large oil-storage tank will also be built. Col. H. L. Stewart, president of the company, accompanied by P. McCardell, were at the mines a few days ago. Mr. McCardell made a survey for the proposed tram from the mine to the mill. His survey demonstrated the expediency of putting in a 1200-ft. aërial tramway from the mouth of the tunnel just completed to the mill site.

Tom Reed—Four bars of bullion, weighing more than 500 lb., and worth about $100,000, were recently shipped to Kingman. This was the result of a three-weeks' mill run. The company has recently been acquiring some of the surrounding claims, both for their mineral and water supplies.

I. X. L.—It is reported that work has been resumed; C. G. Atlee, in charge.

Telluride Mining, Milling & Development Co.—This company is installing a hoist and expects to have a force of men at work soon. The property is in the Tom Reed district. Mr. Rose is superintendent.

California

Amador County

Oneida—The development of the 1800 level of the South Eureka, adjoining the Oneida on the north, is showing some good ore and indicating the extension of the South Eureka vein into the Oneida ground. The owners have spent much money in the development of the Oneida preparatory to reopening the property. The mine was formerly a large producer, and is equipped with a 60-stamp mill, which will be again placed in commission when the development warrants. W. H. Schmal, of Sutter Creek, is superintendent of both properties.

Mountain King—This prospect, in the Pine Grove district, on the East belt, is still producing rich surface ore. The ore is extracted and treated by hand, and the shaft is only 20 ft. deep. Ben Pitts is owner. The property is worked by Pitts and his wife.

Kennedy—The deepening of the 3450-ft. vertical shaft, which was begun in August, was extended to 3680-ft. level, where a station was cut and a compressed-air hoist installed. The shaft is now being deepened to the 4000-ft. level. It is understood that drifting and stoping will then begin at the 3680- and 4000-ft. levels. Recent reports state that the pay ore on the levels above the 3680-ft. is improving in grade, and that some high-grade ore is being extracted. Webb Smith, of Jackson, is superintendent.

Hardenberg—Gravel and cement for the concrete foundations and lumber for the housing of the new 20-stamp mill are being delivered. S. N. Kelsey, of Jackson, is superintendent.

South Jackson—The new vertical shaft has been sunk to the 450-ft. level, and will be deepened to about 550 ft. before crosscutting the formation to the inclined vein is started. Machine drills are used.

Bunker Hill—Dividend No. 76, of 5c. per share was paid Oct. 15. The dividends paid have averaged about 5c. per share, or $10,000 per month, making a total of approximately $750,000 in about six years. E. Hampton, of Amador City, is superintendent.

Keystone—The shaft has reached a depth of 2000 ft., which is 660 ft. below the old workings. A soft slate formation has been cut in the shaft, which is considered a good indication of ore in the vicinity. C. R. Downs, of Sutter Creek, is manager.

Butte County

Berry Creek—The tunnel is in about 100 ft. and pay ore is being milled. The ore is reported to be high grade. Charles Willetts is owner.

Kid—Pay gravel is being washed by underground sluicing. A pipe line is being installed preparatory to increasing the number of men. The property is 18 miles east of Chico. George F. Slimmer, of Durham, is superintendent.

P. B. Steifer Mining Co.—This mine, in the Magalia district, has been unwatered for the first time since 1908, when the power plant was destroyed by flood from the west fork of Feather River. Two new units have been installed and a new power house erected. Power is furnished from a reservoir held

by a dam 75 ft. high and 125 ft. long. Active mining will be resumed immediately.

Crystal Hill Gold Mining Co.—This company has been organized by eastern men, who have purchased the Princess mine, near Magalia. R. S. Andrus is superintendent.

Blue Hog—This mine, near Magalia, has resumed operations, after having been closed down since May on account of shortage of water. John Lopozich, of Los Angeles, is president and manager.

Calaveras County

Ferraris—It is reported that a 12-ft. vein of talc and quartz has been disclosed at a depth of 55 ft. in the shaft. The shaft will be deepened to 400 ft. The ore is said to be above the average grade. John Ferraris, of Albany Flat, is manager.

Angels—The 40 stamps are dropping on good ore taken from the 850-ft. level. Allan Randall, of Angels Camp, is superintendent.

Gold Cliff—The 60-stamp mill is again in operation. The ore from the lower levels now being crushed is reported to be the best that has been taken from the mine. F. J. Martin, of Angels Camp, is manager.

Waterman—The 5-in. prospecting drill has drilled to a depth of 125 ft. Surface buildings have been erected, and preparations are being made for the installation of operating machinery. H. W. Kuns, of Angels Camp, is manager.

Melones—The 100-stamp mill is crushing good ore, taken from the north side of Morgan Hill, through the glory hole to the tunnel at the 1100-ft. level. W. G. Devereaux is manager.

Dolling—Recent development has disclosed a large shoot of pay ore in the new winze sunk from the 400-ft. level. A room is being cut out at this point for the installation of a compressed-air hoist. The southwest drift on the 400-ft. level is making a good showing. D. G. Overall, of Angels Camp, is superintendent.

Eldorado County

Murdock—This gravel mine, near Smith's Flat, is being equipped for handling a large quantity of gravel in the coming winter. Burger Bros., of Placerville, are owners.

Landecker—The mine has been recently sold by Burges Bros., of Placerville, to Los Angeles and San Diego men, and is again in operation.

Tuolumne County

Jumper—Twenty stamps are dropping on good ore from the upper levels. Thirty men are employed. This is an old mine, near Jamestown, that was a big producer in the early mining days. Development and exploration of the old workings have been in progress for the last year. Neil Cochrane is superintenden

Colorado

Gilpin County

Mountain Lion—The Mountain Lion and Gilpin County mines, at Central City, have been leased by Denver men, with R. L. Martin, manager of the U. P. R. mill, in charge. The two mines have a good record for producing milling and smelting ore in the early days, but were closed down when the influx of water in the joint shaft, which is 545 ft. deep, rendered production unprofitable. Since the Newhouse tunnel began to drain this region work can be more economically carried on. It is said that ore worth $227,000 is already available.

Lake County-Leadville

Penrose Shaft—Efforts are being made to obtain a lease on the Penrose & Coronado shafts and if the owners agree as to terms, the lessees will unwater these down-town shafts, and prospect for zinc-carbonate ore.

Creole Mining Co.—This lately organized company has obtained control of the Oro La Plata, Gueson, and part of the Montgomery lodes, which are being worked through the La Plata shaft.

London—The long talked of crosscut to intersect this vein at the head of South Mosquito Gulch has at last been commenced. It will take several months to cut the vein, but when it is accomplished the upper workings will be drained and the ore handled at a much reduced cost.

Columbine—A good vein of lead-zinc ore, containing some gold, has been cut by Peter Horrigan, at the 175-ft. level in this mine at Bonanza.

Long & Derry—At this mine in Iowa Gulch a good tonnage of high-grade lead ore is being shipped steadily.

Ella Beeler—Lessees in the Ella Beeler tunnel are making regular shipments of high-grade silver-lead ore from the lower tunnel. The tunnel is nearing the Houston vein.

Fairplay—A good tonnage of lead ore carrying gold and silver is being shipped monthly by Manager Covey from this mine in Adelaide Park. The 100-ft. level is being driven toward the fault and some streaks of rich gold and silver ore have been found. A 37-hp. electric hoist is being installed and engine house, ore bins, and other buildings being erected.

La Plata—In the La Plata shaft, Rock Hill, lessees have opened zinc-carbonate ore at the 360 level.

Gilt Edge—A new headframe, engine house, and 37-hp. electric hoist have been erected on the shaft of this mine in California Gulch, and the collar of the shaft is being retimbered.

New Monarch Mining Co.—Work is to be started at the shaft in South Evans gulch as soon as Manager Watson can get a supply of coal, when he will unwater the shaft and prospect from the bottom level. At present the company is working on different levels on the Cleveland down to the seventh level and shipping a fair tonnage of ore monthly.

Teller County-Cripple Creek

Elkton—A 2c. dividend has been declared. During October 6000 tons of $18 ore was produced. It is said that the Tornado shaft is to be leased and that the Gregory shaft will be worked on company account. The main shaft is now 60 ft. below the 11th level and as soon as the water recedes 40 ft. more a new level will be driven.

Mary McKinney—Accompanying the 2c. dividend checks just issued, is a report covering the nine months ended Sept. 30, 1912. The company shipped 8035 tons of ore, of a gross value of $221,281, and lessees shipped 2544 tons, of a gross value of $42,585. Minor revenue brought the total receipts to $265,197, of which $161,482 was spent for treatment and other charges. The total net income for the nine months was $103,825. The cash on hand Sept. 30 was $94,150.

Progressive Mining & Leasing Co.—This company, Charles Waldron, manager, is installing a 75-hp. hoist and 100-hp. compressor at the Chicken Hawk mine on Guyot Hill. These will be ready for operation in about one month. This is a Denver company.

Gold Dollar—A dividend of $12,500 will be paid Dec. 1, 1912. The development work, which consisted of sinking the shaft and driving a drift from the water level, has been profitable, and the main orebody is said to be proving up so well that it is believed the company will now be able to pay dividends regularly.

Work Mining & Milling Co.—From the different shafts of this company on Raven Hill a good production is being made by lessees, chief of whom is Russell & Co., working through the Davenport shaft of the Doctor Jack Pot.

San Juan Region

Preparations for work during the winter are being made. At the Tomboy, in Savage Basin, above Telluride, the tramway from the Ophir tunnel to the Pandora railway loading station is nearly completed, the timbers for the 10 towers are all framed and foundations in, and it is expected that the two terminals will be built and the tramway running by the end of this month. The Ophir Gold Mining & Milling Co. has nearly completed the building of its 150-ton cyanide plant, for which a part of the machinery of the old Suffolk mill was used. At Rico the Rico-Wellington company is remodeling the Pro Patria concentrator, and the Rio Grande Southern R.R. has laid a spur to the mill. At Ouray the Humboldt mine, in the Sneffels district, will have 30 men at work all winter.

Idaho

Idaho County

Mascot—A concentrating table will be installed. The ore continues to plate well and the mill is operated steadily.

North Star—The mill, which has been treating ore from the Dillinger mine, is preparing to do some custom work on ores from near-by mines.

Penn-Dixie—The management is making arrangements to put in a compressor. The No. 2 tunnel will be driven under the shaft and a raise will be started to connect with this shaft.

Knob Hill—The force has been increased by putting on a night shift in the tunnel.

Mineral Zone—A 30-ft. sump has been completed below the second level and drifting has been begun from the No. 2 station both east and west.

Majestic—Work has been begun in what is known as the Campbell drift from the No. 3 tunnel. Thomas Pritchard, until recently mine foreman, has been made superintendent and will have charge of the property this winter.

Michigan

Copper

Superior—The construction of the extension of the Isle Royale railroad to the Superior shafts is progressing satisfactorily and should be completed within a few weeks. This connection will afford facilities for shipping to the Lake Milling, Smelting & Refining Co.'s mill, where the ore is to be treated. At present it is being treated at the Atlantic mill.

Adventure—This company has rigged up a drilling outfit at the bottom of its No. 5 shaft and will test the formation at depth, it being somewhat shattered at the place that the formations are being opened, although an encouraging run of ground is being exposed in driving on the lode.

New Arcadian—The shaft at this property is about 225 ft. deep. The surface equipment has been completed and is working satisfactorily. A station is to be cut at a depth of 250 ft., but no lateral opening will be made until a depth of about 500 ft. is reached.

Isle Royale—Encouraging ground is being opened on the Grand Portage lode. This formation lies about 200 ft. west of the Isle Royale lode and is being opened by a crosscut from No. 2 shaft. The underground working force has been gradually increased and openings put in shape to increase production. Connections with the Mineral Range R.R. are about completed so that the increased tonnage can be shipped to the Lake Milling, Smelting & Refining Co. plant.

Iron

The company has placed an order for 400 new steel ore-cars of 50 tons capacity with the American Car & Foundry Co. The type of car will be the same as used on the Lake Superior & Ishpeming Ry., being somewhat different from the other cars of the "South Shore." With this addition, the company's usable cars will number 1100. The new steel cars will cost about $1000 each. The South Shore serves 15 active mines on the Marquette Range; its ore docks are at Marquette.

Caspian—At this mine of the Verona Mining Co., at Palatka, the shaft-house was destroyed by fire Oct. 18. The ore crusher suffered some damage, but there was no break in the steam line, so pumping was not interfered with. The fire occurred at 7 p.m.; two hours later work was resumed underground. A temporary headframe, 45 ft. high, has been erected.

Oliver Iron Mining Co.—This company recently arranged a lecture on first aid to the injured, for its officials and rescue crews on the Menominee Range. The lecture was delivered by Dr. Shields, of the Red Cross society.

Rogers—Drifting has been started at this new Rogers-Brown mine. The pump stations at the shaft were cut some time ago.

Corrigan, McKinney & Co.—The machinery from the old Fairbanks or Paint River mine at Crystal Falls has been transferred to the Tobin mine, where it is installed in No. 2 engine house, recently erected.

Imperial—The steam shovel having loaded nearly all the stockpile, has been sent back to Ishpeming.

Cascade Mining Co.—Shaft sinking has been stopped temporarily to allow concreting through the overburden. The air compressor will be set up so that when sinking is resumed, compressed air will be available for actuating the rock drills. Up to this time steam has been used.

Chase—At this mine of the Cleveland-Cliffs Iron Co., at Dexter, where operations were resumed a short time ago, the water has been pumped out. The shaft, which is down 300 ft., will be sunk deeper; drifting is in progress on three levels. About 30 men are employed.

Breitung - Hematite — Diamond drills have been operating at this mine for more than a year, seeking a site for a new shaft. Most of the drilling was done east of the present shaft in the swamp at the foot of the hill. It has now been demonstrated that there is too much ore at this place, and it is planned to put the new shaft back up the hill, south of the present shaft. A diamond drill is operating there. The shaft will probably be started during the winter, and will be the same size as the Lucky Star shaft of the same company. It will be raised from the underground workings about 700 ft. deep; eventually the shaft will be 2000 ft. deep.

Florence Iron Co.—This company has contracted with the Peninsula Power Co., of Iron Mountain, for electrical power for its Ernst mine, at Commonwealth, Wis., and its Florence mine, at Florence, Wis.

American—On the ninth level, a drift has been driven across the western boundary into the Mass lands, controlled by this company; a raise will be put up to hit ore shown by drilling. On the 12th level, a drift is being driven in the same direction.

Oliver Iron Mining Co.—In the drilling in progress west of Republic, on the lands of the Michigan Iron & Land Co., difficulty has been experienced from extremely deep overburden containing boulders. In some cases there is over 200 ft. of overburden.

Minnesota

Cuyuna Range

Shipments of iron ore from the Mesabi range to the Duluth docks continue, but there has been a gradual decrease in shipments. Many of the independent mines are making plans to maintain operations during the winter.

At the stockpiles at the Pioneer A shaft and at the Zenith mine, both of which are operated by the Oliver Iron Mining Co., steam shovels have been in operation and the stockpiles are nearly cleaned up. Extensive preparations are being made for stockpiling this winter; new trestles will be erected at several of the shafts.

Wadena—Advance royalties have been paid to the owners by the E. J. Longyear Exploration Co., which is operating the property. The property consists of about 80 acres of land that has been fairly well prospected by drilling both by the owners and the leasing company. The lessees are to pay $6000 per year as advance royalty for the first three years and $9000 per year thereafter. When actual mining commences the owners are to receive 30c. per ton of ore mined.

Pearson — This property has been closed for the winter.

Hawkins—The concentrator is to be shut down in the near future.

Crosby—This property will be operated through the winter.

Ruddy—This mine is about ready to resume operations, after having been closed for nearly three months while the work of removing the débris which was washed into the mine by a cloudburst was under way. It is stated that the workings were not damaged beyond being partially filled with mud and débris.

Morton—This state mine, near Hibbing, will be operated during the winter and a larger force of men will be put to work as soon as enough underground miners can be found. This property recently went on the shipping list and will continue shipments direct from the shaft as long as lake navigation remains open. Low-grade ore is going to the stockpile.

Montana

Butte District

Ophir—The Butte Central Copper Co. has completed the erection of the 150-ton concentrator building and cyanide plant at the Ophir mine. Machinery is being installed and operations will commence about the first of the year. The construction work and installation of machinery is being done under the supervision of John E. Rothwell. From tests made of the ore, the mill is expected to save 80% of the silver and 90% of the gold, as well as a large proportion of the copper and lead. Development work in the mine during the last few months has been confined principally to the 500-ft. level, where much ore, carrying silver, gold, lead and a little copper has been opened. The silver averages from 15 to 40 oz. per ton; gold $1 to $1.50; lead from 8% to 16%; some copper ore runs as high as 1½%. As soon as the concentrator is started it is planned to unwater the shaft to the 1000-ft. level and begin development work at that depth. Recently the company acquired the Shonbar property, adjoining the Ophir mine on the south, and which was opened to the depth of 300 ft. in the early days, and produced considerable gold and silver. A crosscut will be driven on the 500-ft. level of the Ophir to intersect the Shonbar vein.

Butte & Zenith City Mining Co.—Butte and Duluth men have recently incorporated this company, capitalized with 300,000 shares, par value $10, to develop 241 acres of patented ground and two unpatented claims, six miles west of Butte, near Silver Bow junction. The officers and directors of the company are: John Killorin, William White, I. Feimuth and John A. Percival, of Duluth; Solomon Gensberger, of Butte, Goodwin T. Paul and James Murray, of Dillon. Six or seven veins outcrop on the property, and the company is preparing to sink a 500-ft. shaft at about the center of the property, and crosscut to the veins. Work will be started upon the buildings, and installation of a hoist with capacity for sinking to a depth of 1000 feet.

Broadwater County

Development work is being done at a number of properties in the Radersburg district, and ore is being blocked out at the Keating, Ohio-Keating and several other mines in anticipation of the early completion of the branch line of the Milwaukee railroad from Three Forks. At present construction has been suspended, but the roadbed is nearly completed, ready for laying rails, and it is probable that the work will be started again soon and be finished by the first of the year.

Keating—The shaft has been sunk to the 800-ft. level; a station has been cut, and development work is under way. A pump is now being installed on the 800-ft. level, and upon the completion of this work, a crosscut will be driven north of the Blacker shaft to the orebodies. On the levels above, ore is being blocked out, and when the railroad is completed the company will be in a position to ship 200 tons of ore daily.

Ohio-Keating—At this property, adjoining the Keating on the west, the shaft is being sunk to the 500-ft. level, where a station will be cut and development work be started. Mining is being carried on steadily, and the ore is shipped in wagons. The vein is parallel to that in the Keating, the ore being of a similar nature, containing gold, and a little copper.

Cascade County

Florence Mining & Milling Co.—This company, which took over the Florence mine, at Neihart, seven months ago, has greatly improved the surface plant, and has developed the property to the producing stage. A steam hoist, with capacity for hoisting from a depth of 1200 ft., and a six-drill air compressor, have been installed. A blacksmith shop, assay office, bunk houses and ore bins have been erected; and the Great Northern R.R. has built a spur to the mine. The shaft has been sunk 1100 ft., and a station cut on the 500-ft. level. The vein was opened in cutting this station, and drifting is in progress in both directions on the vein, both faces being in commercial ore. There are two carloads of ore in the bins, and it is believed that regular shipments will commence in two or three weeks. The officers and directors are: W. F. Smith, John A. Percival, Charles T. Fitzsimmons and Frank S. Sleeper, of Duluth; and Max Stevens, of Ironwood, Michigan.

Nevada

Comstock Lode

Consolidated Virginia—A development of importance has just been made on the 2300-ft. level in the northeast drift, started 25 ft. from the mouth of the east crosscut from the shaft station. The vein has been encountered at a point about 140 ft. in, and 4 ft. of quartz in place has been opened up on the hanging wall. Car samples of the material saved, show the ore to be low grade at the place where found in the vein. The prospects ahead on this level are considered favorable, for the same vein has already been tapped a considerable distance to the north, but exploration was prevented on account of a large flow of hot water. The new pump equipment on the 2300 station is now equal to handling any amount of water that may be found and driving will be continued to develop the vein.

Union Consolidated—The west crosscut from the north drift, at a place 40 ft. south of the north boundary line has recently cut strong quartz stringers, and these will be followed both north and south.

Sierra Nevada—The north drift on the vein has entered a fault, which is now being crossed to pick up the vein on the other side. The fault strikes west of north, and is the third fault to be crossed since the exploration left the Union line.

Crown Point—The assays of the ore extracted recently show a gradual increase, the last report giving 421 mine cars sampling above $15 per ton. Ore is being shipped steadily to the Yellow Jacket mill.

Clark County

Monte Cristo—Duncan & Fredrickson, who have this property under lease and bond, have opened zinc-carbonate ore near the surface. Shipments have been going forward for the last month at the rate of two cars per week, and the lessees are considering the purchase of a motor truck for the seven-mile haul to Jean.

Churchill County

Nevada Hills Mining Co.—During September 3915 tons of $23 ore was milled for a recovery of $82,647 at a net profit of $49,790.

Esmeralda County

Goldfield Consolidated Mines Co.—J. F. Thorn, general superintendent, reports that during the quarter ended Sept. 30, 94,145 tons of ore yielded $1,245,861. Operating costs totaled $581,923; construction costs, $2079; net operating realizations, $661,859.

Nye County

Shipments in tons from Tonopah mines to date and for the week ended Oct. 26, are as follows:

Mines	Week	Year to Date
Tonopah Mining	3,450	144,419
Tonopah Belmont	3,185	104,865
Montana-Tonopah	1,085	44,463
Tonopah Extension	1,050	43,123
West End	800	32,672
Midway	50	720
MacNamara	470	16,009
North Star	.....	266
Mizpah Extension	.....	40
Jim Butler	300	3,100
Totals	10,390	389,677
Estimated value	$259,750	

North Star—A hoist has been installed on the 1250-ft. level and sinking on 4 ft. of good ore has been resumed.

Halifax—This company is installing a 300-hp. electric hoist and will sink the shaft from the present depth of 1400 ft. to the 3000-ft. level. A drift on the 1000-ft. level is being run on mill ore.

Jim Butler—A hoist has been installed on the 600-ft. level and sinking has been started on 3 ft. of good ore. A raise from this level on a parallel vein shows 6 ft. of good ore.

West End—The profits for September exceeded $40,000. An 18-drill Nordberg compressor has been purchased and the hoist is being increased to 150 horsepower.

New Mexico

Soccoro County

Ernestine Mining Co.—The main tunnel, west, has opened new ore, 10 ft. wide, of excellent milling grade. This is the fifth oreshoot proved on the property. The main tunnel, east, is also entering pay ground. Both of these are in virgin territory. The first 20 days in October yielded 22,550 oz. of gold and silver bullion and 15,500 lb. of high-grade concentrates; 720 tons of ore was milled during the week ended Oct. 26.

Socorro—Drifts have been advanced 50 ft., both east and west, on the eighth level, and the three-compartment shaft is being sunk to ninth level. The 500, 700 and 800 levels are all yielding a good tonnage of milling ore.

Deadwood—Five bars of gold and silver bullion were shipped for second 10-day cleanup, in October. During the week ended Oct. 26, 350 tons of ore was milled and 35 ft. of development work done in mine. Fine milling ore is coming from the lowest level.

Oaks Co.—Eight out of the nine development headings now being advanced by this company are yielding a good grade of ore, which is being sent to the custom mills. Shipments for the week ended Oct. 26 amounted to 102 tons.

Deep Down—During the week ended Oct. 26, 90 tons of ore was shipped to the custom mill.

Utah

Beaver County

Indian Queen—Lessees are still operating on this property, near the old Horn Silver and South Utah. Some lead ore is being mined.

Majestic—October shipments promise to exceed the record of the month preceding. Up to Oct. 24, 33 cars of copper-iron fluxing ore were shipped. There has been a shortage in railroad cars, which has retarded shipments. During the last week, two cars only could be secured, while 10 cars of ore were on hand awaiting transportation.

Revenue Consolidated—A small force of men is working at this property, 18 miles southwest of Newhouse. A tunnel has been driven 136 ft. on the contact of quartzite and white limestone. The objective point is an old shaft, in which ore carrying lead, silver and some gold, has been opened. Between 75 and 100 ft. remain to be driven.

Sheep Rock Mining & Milling Co.—A bond and lease have been taken on this property, in the Newton district, by Beaver County and St. Louis men. The ground consists of 10 patented claims, covering about 175 acres. During the Robinson brothers' lease, a good tonnage of high-grade gold ore was mined from two oreshoots, about 600 ft. apart, and within 40 ft. of the surface.

Iron County

Further prospecting and some development is being done on the Bull Valley gold discoveries, below Modena. Several small tunnels have been driven and open cuts made. One tunnel is in about 100 feet.

Juab County

Tintic Standard—The new winze being sunk from the 1000-ft. level is down 40 feet.

Lower Mammoth—Shipments have been somewhat delayed by the shortage of railroad cars. Two carloads are in the bins awaiting shipment. More than half the force is working on development, but notwithstanding this, expenses or better will be made during October.

Chief Consolidated—An explosion of powder recently wrecked a part of the ore bins. The money loss is stated to be less than $500.

Dragon Consolidated—E. R. Higginson, who has been at the Black Jack has been transferred to this property, and is superintending the shipment of iron ore.

Gold Chain—Much prospecting is being done and ore is being mined. A drift from the Lower Mammoth has been driven into the western part of the property at a depth of about 700 ft. below the 1000-ft. level. Developments here are being watched with considerable interest.

Salt Lake County

Cardiff—Preparations for continuing work during the winter are being made, and supplies are being hauled to the mine. Ore is being sent down, and shipments will be continued until the closing up of the road. Work has been resumed in the lower tunnel. A total of 15 men is employed at the property.

Summit County

Park City shipments for the week ended Oct. 19, amounted to 3,167,400 lb.; for the week ended Oct. 26, to 3,153,420 lb. The principal shippers were the Silver King Coalition, Daly-Judge and Daly West.

Mines Operating Co.—This company, which has a 10-year lease on the Ontario to work old stope fillings, etc., has started operations by its new milling process, and reports that, aside from demonstrating the roasting capacity to be slightly insufficient, the new process is a success. The treatment consists of dry crushing, chloridizing roasting and cyaniding, an extraction of up to 90% silver is reported. A small tonnage of ore is being treated at present, and the mill will be brought up to full capacity in the near future.

Diamond-Nimrod—Suit was filed against this company, Oct. 24, by Harry Joseph, for the collection of $48,915, alleged to be due for money advanced and on various contracts during the last five years.

New York Bonanza—During September, shipments were made, the returns from which were sufficient to continue development work. This is being carried on in a new section of the property. The grade of the ore has been somewhat better, being reported to net the company around $15, exclusive of mining costs.

Tooele County

Bullion Coalition—A steady production of between 250 and 300 tons of ore weekly is being made by this property, at Stockton, both by lessees and company.

Lion Hill Consolidated—A new strike is reported from the Chloride Point incline of this property, at Ophir. A narrow streak of ore, carrying silver chloride with some gold, has been cut, this being surrounded by lower-grade material. Silver ore has recently been opened in an 80-ft. raise from the East Side tunnel. About 20 men are employed.

Utah Mine—Thirty tons of good-grade silver-lead ore has been shipped from this property, at Fish Springs, 75 miles from Oasis, the nearest railroad station.

Washington

Ferry County

Harper Consolidated—This company is considering the erection of a large stamp mill for the property in the Republic district.

North Star—A 265-ft. shaft is being sunk on this property, and other improvements are to be made in the near future. Harry Wilson, Orient, is superintendent.

Mogul—A road is being built to this mine in the Orient district and preparations are being made for starting a long tunnel.

Surprise—The North Washington Power & Reduction Co. recently produced from this property a bar of gold bullion valued at $7800.

Okanogan County

El Dorado—This company has been organized by Henry Barrs and others of Oroville, for claims in that vicinity.

Stevens County

Gray Copper—Some fine copper ore has been found in the tunnel on this property near Chewelah, and additional improvements are to be made. Oscar DeCamp is superintendent.

Wyoming

NATRONA COUNTY

The area of the Salt Creek oil field has been enlarged by the bringing in of a new well with a flow of 100 to 500 bbl. per day, owned by the Northwestern Oil Co., a Denver company. This field is 45 miles north of Casper. The Midwest company has enlarged its Casper refinery to 7000 bbl. per day and is said to be producing oil in excess of its refinery capacity, all tanks being full. The Salt Creek field was discovered last June and the oil-producing area is being rapidly increased.

Canada

ONTARIO—COBALT

Shipments of ore and concentrates, in tons, from Cobalt for September, 1912, were:

Beaver	55.12
Buffalo	124.91
Chambers-Ferland	73.29
Cobalt Townsite	241.78
Cobalt Lake	128.74
Coniagas	163.95
Dominion Reduction Co.	56.65
Drummond	52.75
Hudson Bay	35.61
Kerr Lake	30.30
La Rose	315.23
McKinley-Darragh	151.79
Nipissing	179.24
O'Brien	107.70
Right of Way	32.60
Timiskaming	50.58
Trethewey	27.65
	1827.89

On the Elk Lake Branch of the Timiskaming & Northern Ontario Ry., steel has been laid across the Jean Baptiste River, 12 miles west of Earlton. About 140 men are at work at the following properties: Beacon Consolidated, Donaldson, Fleur de Lys, Cobalt Frontenac, Patricia, Regal, Sterling, Paragon, Cobalt, and the McKenzie.

Red Rock—Surface work has been started on this property, which has been leased by the Lost & Found Company.

Millerett—The concentrating plant at this Gowganda property has been closed, owing to the exhaustion of the supply of low-grade ore on the dumps. Negotiations are in progress for the leasing of the mill to the Miller Lake-O'Brien adjoining, while explorations for new ore are being made.

Cochrane—This mine has been taken over by the General Assets Co., of Montreal, and a contract let for the erection of camp buildings and the sinking of a shaft.

Cobalt Townsite—The strike situation is looking more serious. The Cobalt branch of the Western Federation of Miners has taken up the cause of the strikers and the Timiskaming Mine Managers' Association is assisting the company in its endeavors to work the mine. The plant is closely picketed. Underground men are being offered $4 per day to go to work and 15 men have been secured. Some of the stamps at the Northern Customs mill, where the ore was being treated, have been hung up on account of shortage of ore.

Timiskaming & Hudson Bay—During the last year the company paid out $209,547 in dividends, being at the rate of 2700% on the capital. The mill treated 21,439 tons of ore making an average of 69.83 tons per day. The extraction was 86.44%. The average assay of the high-grade ore was 3431 oz. silver and the concentrates 853.73 oz. Three new veins were discovered and several thousand tons of milling ore developed. The work on the company's Gowganda property has proved costly and brought small results.

La Rose—Sinking is being continued at the 500-ft. level on the fault vein, which was picked up on the 380-ft. level.

Cobalt Lake—In the No. 6 workings, a shoot of high-grade ore has been developed.

Gould—The shaft will be sunk to the 200-ft. level and a crosscut run to pick up the vein which has been located on the Seneca property.

Green-Meehan—It is reported that the old company is about to resume control of this property; there has been some trouble with the leases.

Aladdin—This is the old Silver Queen mine; it has been taken over by an English syndicate. About 20 men are at work and development is being done on a vein in the Keewatin formation.

Nipissing—The hydraulic plant, which was used for surface prospecting last summer, has resulted in the discovery of 12 new veins. One of these shows high-grade ore on the surface and last month, from an open cut, $10,000 worth of silver was taken out of this vein.

Beaver—In the face of the main vein at the 600-ft. level, there is five inches of 2000-oz. ore. A new vein has also been found on this level running off in a westerly direction from the main vein. The mine has developed a large tonnage of milling ore and the mill capacity will in the near future be increased from 60 to 120 tons per day.

Provincial—On the 360-ft. level, a crosscut is being driven to explore the ground at this depth. The formation is conglomerate and is the deepest known in the camp.

Seneca-Superior—This company, successor to the Kerry Mining Co., on the Cort Lake and Peterson Lake leases, has cut two veins of high-grade ore in the 200-ft. crosscut from the shaft on Cort Lake. R. H. Lyman is manager and W. E. Segsworth and Kirby Thomas consulting engineers. Extraction from the new veins which will be called the "Worth" veins, after the president of the company, S. Harry Worth, of Philadelphia, will be commenced at once.

ONTARIO-PORCUPINE

Four claims in Gauthier and McVittie Townships, owned by A. Charlebois, F. Beauregard and Boissonault, of Haileybury have been sold to a Montreal syndicate for $250,000.

C. L. Sherrill has taken an option on the Shillington claim adjoining the Rea Mine. It is intended to prospect the property by shot and diamond drills.

Vipond—The principal stockholders have arranged to underwrite a bond issue of $125,000, the money to be used to erect a cyanide plant and to further develop the mine. The cyanide plant will be finished in about two months.

Northern Canada Power Co.—The Wawaietan Falls plant will be finished about the first of the year. This company also owns the plant at Sandy Falls which supplies power to the Hollinger, McIntyre, Pearl Lake, McEnaney, Vipond, Plenaurum and Jupiter.

Scottish Ontario—In the course of surface exploration on one of the group of claims held by this company in Whitney Township, a vein heavily impregnated with sulphides carrying gold and about 10 ft. wide has been encountered in slate and schist.

Apex—The new shaft is down 108 ft., at which depth sulphides appear in the vein which carries increased gold.

Krist—The shaft is being put down to the 130-ft. level in an endeavor to pick up some of the veins found on the adjoining McEnaney property.

Dome Extension—It is reported that this company has opened some pay ore on the 200-ft. level in the crosscut near the Dome boundary line.

Hughes—A two-stamp mill has been ordered for immediate installation for the purpose of testing ores, while plans are being completed for the larger mill. A temporary electric-lighting plant of 100-light capacity is being put in for use until the company can get power and light from the falls.

South America

DUTCH GUIANA

The official report gives the gold production of Dutch Guiana for the nine months ended Sept. 30, at 518,957 grams, or 16,684 oz.; a decrease of 170,629 grams from last year.

Two companies, writes David E. Headley, of Surinam, are now investigating the vein and placer deposits of cinnabar near the Marowyne River. The ore appears to be high grade; the gangue is quartz.

Asia

CHOSEN

Oriental Consolidated Mining Co.—The clean-up for October was $127,500. During September, 27,771 tons of ore was milled for a total recovery of $121,964.

The Market Report

Current Prices of the Metals, Minerals, Coal and Mining Stocks

Coal Trade Review

New York, Nov. 6—The coal trade in the West continues to be affected largely by transportation conditions. Car shortage is becoming serious, and the scarcity of supplies is the cause of complaint at many points. Much the same conditions exist in the Seaboard bituminous trade, but not quite to the same extent.

The anthracite trade is still behindhand, and the cold snap this week has brought out a call for supplies which dealers find much difficulty in meeting.

French Foreign Trade—Imports and exports of fuel in France, half year ended June 30, metric tons:

	Imports	Exports	Excess
Coal	7,217,100	1,068,779	Imp. 6,148,321
Coke	1,314,100	83,592	Imp. 1,230,508
Briquettes	528,100	98,663	Imp. 429,437
Total	9,059,300	1,251,034	Imp. 7,808,266
Total, 1911	9,892,100	772,379	Imp. 9,119,721

Exports this year include 140,701 tons coal furnished to steamships in foreign trade.

French Coal Production—Coal mined in France for half-year ended June 30, in metric tons:

	1911	1912	Changes
Coal	19,153,543	19,825,768	I. 672,225
Lignite	339,256	368,620	I. 29,361
Total	19,492,799	20,194,388	I. 701,58

Of the coal mined this year, 13,487,484 tons were from the departments of the Nord and Pas-du-Calais.

German Coal Trade—Exports and imports of fuel in the German Empire, eight months ended Aug. 31, metric tons:

	Exports	Imports	Excess
Coal	20,564,655	6,394,713	Exp. 14,169,92
Brown coal	35,107	4,779,051	Imp. 4,743,94
Coke	3,696,057	389,345	Exp. 3,306,71
Briquettes	1,776,947	111,532	Exp. 1,665,84
Total	26,072,766	11,674,641	Exp. 14,398,12
Total, 1911	21,942,438	12,068,750	Exp. 9,873,64

Exports this year included 24,618 tons of coke to the United States.

Iron Trade Review

New York, Nov. 6—As November opens there is some falling off in new business, which was not unexpected, and which is not unwelcome to many of the mills.

The near approach of election, usually considered a cause for slowing down of business, seems to have had very little effect this year. The rush of new orders and of specifications had been so great in October that a lull seemed inevitable. The mills will have some chance to work up to their deliveries more closely than they have been doing. No important changes in prices are noted, but there have been advances in one or two minor lines, such as chains and hoops.

Opinions differ a good deal as to what proportion of speculative business is included in the October rush of orders. Most of the larger producers have sought to avoid that class of business, but it is not always possible to discriminate.

Railroad orders for rails, and especially for cars have been prominent features of the October business, and more orders seem to be coming out.

The total production of rolled iron and steel in 1911, as officially reported, was 19,039,171 gross tons, against 21,621,279 gross tons in 1910, the record year. This is a more important item than the production of steel ingots and castings, reported last July. The present year's production of rolled iron and steel promises to approach 25,000,000 tons very closely, if it does not exceed that mark.

Pig iron continues active, notwithstanding the heavy tonnage taken last month. Prices are firm and the advancing tendency is strong. The coke situation does not improve, and production is limited by this cause. The scarcity of labor is also causing some delays, and helps to check the possible increase of production.

Coke has grown still scarcer, and Connellsville furnace coke of standard grade cannot be purchased at less than $4, for prompt shipment, while off grades are bringing close to that figure. Several merchant furnaces would have been blown in before this had it been possible to secure coke at a price commensurate with prevailing prices for pig iron.

Tinplate Trade—Recent changes in the foreign tinplate trade of the United States are shown by the following statement of imports and exports for the nine months ended Sept. 30; figures are in long tons:

	1910	1911	1912
Imports	53,803	12,769	1,502
Exports	8,395	42,557	66,722

Imports have practically ceased, while tinplates have become an export item of export. Of the exports in 1912, Canada took 36,702 tons; China, including Hongkong, 8700; Argentina, 3795; British India, 3630; Japan, 2902; Mexico and Brazil, each about 2000 tons; Cuba about 1100 tons. The remainder went to various other countries.

Baltimore

Nov. 4—Exports for the week included 13,600 lb. steel rails, 100,740 lb. track fastenings and 3,703,800 lb. steel billets to Liverpool; 1,578,435 lb. steel plates to Rotterdam; 1,149,107 lb. miscellaneous iron and steel to Havana; 1,598,786 lb. structural steel and 3,591,895 lb. miscellaneous iron and steel to Panama; 400 lb. selenium to Hamburg. Imports included 6050 tons manganese ore from Poti, Russia; 4593 lb. pyrites from Huelva, Spain; 4950 lb. iron ore from Cuba.

Cleveland

Nov. 4—Lake shipments, it now seems sure, exceeded 7,000,000 tons in October, and will reach a total somewhere over 45,000,000 tons for the season. Shipments from docks are still delayed by short car supply.

Pig Iron—Sales are good and there are some heavy inquiries in for basic pig. Prices are higher and firm. Quotations, Cleveland delivery, are $17.90 for bessemer, $17.10@17.25 for basic; $17@17.25 for No. 2 foundry and $16.25@16.50 for forge.

Finished Material—Pressure for delivery is not quite so strong, but business is good and prices are firm and still tend upward. Jobbers report business active in all lines.

Chicago

Nov. 5—Notwithstanding political distractions, the last week has recorded no check in the buying of iron and steel. Between 20,000 and 25,000 tons of pig iron have been sold, a fair aggregate for this market, and an improvement over the previous week's record. Prices are firm, holding to the high figures of the last two or three weeks. Northern No. 2 foundry iron brings $17.50@18, at furnace, which means about $18@18.50, delivered; Southern No. 2 foundry sells for $14@14.50, Birmingham, or $18.35@18.85, Chicago, with the higher price obtaining on most sales.

The buying is for first half or first quarter, many melters desiring to cover the bulk of their needs for the second quarter as well as the first, and there are some inquiries for third-quarter deliveries. Buying is frequent also for the supply of small lots needed to fill out requirements of melters who have bought conservatively in the past. The tone of the market is one of confidence in the

continuation of present prices and conditions of buying. Election results do not seem likely to make any difference.

In the market for finished products there is a somewhat quieter tone, but nothing to indicate a decided change. Railroad buying continues heavy; structural material is somewhat less in demand, though there is a large number of small requirements that make a fair aggregate. Bars are much sought, but the capacity to supply them is wanting, and prices remain high with the prospect of the demand exceeding the supply for several months to come. Sheet and plate mills are filled with orders into the second quarter and the demand continues for their further products.

Philadelphia

Nov. 6—Active buying has continued during the past week in all lines of pig iron and and prices have hardened in a way that it is simply impossible to give definite figures. That is, different furnaces making the same kind of iron are asking different prices. Some furnace people are accepting first-quarter business where they can get it on their own terms and even second-quarter business. Furnaces are on the defensive. The recent heavy dealings in basic leave very little business to be done at present. Southern furnaces are making no effort to get business with the exception of giving attractive quotations on basic which will probably lead to business in a short time. Forge iron continues to sell freely and in some cases for later delivery than usual. The coke situation is a most disturbing factor. Fuel is advancing and the outcome of prices depends upon factors not yet in sight. No. 2 X foundry is $18.50; forge, $17.50; basic, $18.50; low phosphorus, $24 per ton.

Billets—Basic openhearth billets are nominally quoted at $30, but as high as $34 has been paid.

Bars—Iron bars are quite active in a wholesale and retail way at 1.65@1.70c., and steel bars are quoted as low as 1.60c., with a large volume of business seeking acceptance for forward delivery.

Sheets—Sheet mills are unable to accept all of the business which has been offered recently upon the terms of delivery insisted on by buyers.

Pipe and Tubes—The market appears to be unusually quiet, but this is merely due to the fact that nearly all consumers are well protected by contracts or stocks in hand. The consumption is remarkably heavy.

Plates—Steel plate is in very active demand and material for cars, ship work and, in fact, every kind of work calling for plate, is wanted for delivery extending in some cases into the spring months.

Structural Material—It is a fight between buyers and makers as to the placing of much business that is being presented. For the rest of the year there is very little capacity to be filled up and the railroad requirements are making themselves safe even as late as the second quarter.

Scrap—The scramble for scrap still continues, with a growing scarcity of supplies which amounts to a serious inconvenience in some cases.

Pittsburgh

Nov. 5—The local iron and steel market shows no material change in the week, unless for an accentuation of the quietness as to contracting and specifying against contracts which began to be noticed in some quarters three weeks ago. This is generally attributed partly to the shadow of the national election, and partly to the fact that engagements between producers and consumers are already enormous. It is not felt that it betokens any tendency toward weakness in the market, because a heavier pressure for prompt-delivery material is being experienced, resulting in the payment of premiums higher than ever. These are particularly marked for merchant-steel bars, which readily bring 1.80c. for carloads for prompt shipment, while ton lots out of store bring above two cents.

A large part of the contract tinplate business for next year has been closed in the past two or three weeks, including a majority of the important contracts for tinplate for packers' cans. Business with jobbers has been closed only for the first quarter. It is predicted in some quarters that an advance from $3.60 to $3.70 will be made within a few weeks when all the heavy business has been closed. An estimate is made of this year's production at 950,000 gross tons, which compares with 783,960 tons officially reported in the past week as last year's production.

Pig Iron—The pig-iron averages for October, compiled by a leading trade interest from actual sales of 1000 tons and over, are announced at $17, Valley, for bessemer, and $16.184, Valley, for basic, representing advances over September of $1.038 for bessemer and $1.05 for basic. The bessemer average was made up of about 50,000 tons, all sold at $17, this not including a fairly large tonnage sold by a furnace outside the Valleys. The basic average was made up of a slightly larger tonnage than the bessemer, largely of sales at $16@16.25, but there was a limited tonnage included at higher than $16.25. The market has been quiet the past week as regards actual sales, but there is greater pressure for deliveries, several of the furnaces being decidedly behind, partly by reason of consumers calling for heavier shipments and partly by reason of poor working of furnaces on account of irregularities in the quantity and quality of coke received. Premiums are obtainable on foundry iron for early shipment, and the market is not closely quotable on account of the absence of governing sales. We quote: Bessemer, $17; basic, $16.25; No. 2 foundry, $16.50@17; forge, $16@16.50; malleable, $16.25@16.75, all f.o.b. Valley furnaces, 90c. higher delivered Pittsburgh.

Ferromanganese—Shipments are behind on nearly all ferromanganese contracts, and buyers are seriously incommoded. It is difficult to place fresh contracts at the regular price, on account of uncertainties whether production can be maintained, on account of scarcity of ore. Prompt material is scarcely quotable, there being hardly any offered. We quote prompt nominal at $70@75, and contract at $61, f.o.b., Baltimore.

Steel—There are very few transactions in unfinished steel on account of limited offerings, but occasional sales indicate that the market is 50c. or $1 per ton higher. There are no offerings on contract for next year, the large mills stating it will require them to stay out of the market a quarter in order to get caught up. We quote, largely nominal: Bessemer billets, $26.50; sheet bars, $27; openhearth billets, $27.50; sheet bars, $28, f.o.b. maker's mill, Pittsburgh or Youngstown. Rod quotations of $29 have been withdrawn, and a few sales have been effected for delivery before the close of the year at $30, Pittsburgh, while the same price would rule on contracts for next year. Even at the advance, rods are low compared with billets.

Sheets—Specifications on contracts continue very heavy, and mills have fallen farther behind. They now have, on an average, more than enough business actually specified to carry them into January, with specifications still coming in at a fairly heavy rate against contracts expiring Dec. 31 and which are at considerably lower rates than those ruling for next year's contracts. The mills which have been ready to sell for next year now have the great bulk of their first-half production under contract, and those which have been reserved about selling, on account of uncertainties as to steel supply, are still practically out of the market. Premiums continue the rule for any early delivery. We quote: Black sheets, 28 gage, 2.25@2.35c.; galvanized, 28 gage, 3.40@3.50c.; blue annealed, 10 gage, 1.65c.; painted corrugated, 2.45c.; galvanized, 3.45c., Pittsburgh.

St. Louis

Nov. 4—The pig-iron market continues active. Sales are not quite so heavy. Agents are not pushing for business, most of them preferring to wait for better prices. On No. 2 Southern iron, $14 Birmingham, or $17.75 St. Louis, is the minimum price. A premium of 50c. per

ton over this price is being generally asked for second-quarter delivery. Northern iron is being quoted around $18.50 St. Louis.

The demand for finished products continues to be exceedingly strong. All of the steel foundries and car shops have more than they can do.

Coke is very scarce; $6.50 St. Louis is asked for first-class Connellsville, with very little to be had. Byproduct coke is in excellent demand.

Iron Ore Trade

A charter is reported of a steamer to carry iron from a Spanish port to Philadelphia at 12s. 9d.—$3.06 per ton. This is said to be the highest rate for many years. Very little foreign ore can come here at such rates.

Lake Superior iron-ore shipments in October totaled 7,010,219 tons, making 43,348,601 tons moved down the lakes to Nov. 1. Estimating the wind-up of the season in relation to the October shipments, with an estimate of the all-rail movement for the year, a total season movement of 50,000,000 tons is indicated, passing the record total of 1910 by 6,560,000 tons, and the movement in 1907 and 1909, the next best years, by 7,500,000 tons. The season is ending with heavy pressure for the movement of ore, and an advance in prices of 50@75c. is probable for next year, with heavy shipments at the opening.

British Imports—Imports of iron and manganese ores in Great Britain nine months ended Sept. 30, long tons:

	1911	1912	Changes
Iron ore	4,972,955	4,845,023	D. 127,932
Manganese	288,280	272,116	D. 16,164

The largest imports of iron ores are from Spain. There are practically no exports.

Sault Ste. Marie Canal Traffic

The total freight passing through the Sault Ste. Marie Canal in September was 10,467,782 short tons. This has never been exceeded except in August. The total freight reported for the season to Oct. 1 was, in short tons:

	1911	1912	Changes
East-bound	26,630,196	39,613,431	I. 12,983,234
West-bound	12,807,971	12,339,277	D. 468,695
Total	39,438,167	51,952,708	I. 12,514,541

The total number of vessel passages this year was 16,543, showing an average cargo of 3140 tons. The mineral freights included in the totals were as follows, in short tons except salt, which is given in barrels:

	1911	1912	Changes
Coal	11,564,977	10,865,581	D. 699,396
Iron ore	23,665,119	35,096,829	I. 11,431,710
Pig and mfd. iron	301,545	459,756	I. 158,211
Copper	83,212	73,784	D. 9,498
Building stone	4,367	2,282	D. 2,085
Salt, bbl.	480,277	486,719	I. 6,442

Iron ore was 67.2%, and coal 20.9% of the total freight this year.

Metal Markets

New York, Nov. 6—The metal markets show little change from the last report, and fluctuations have been small.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold			
Sept. 1912	$ 568,302	$ 4,200,682	Imp. $3,632,380
" 1911	2,352,861	4,704,096	Imp. 2,351,235
Year 1912	43,728,274	38,789,793	Exp. 4,938,481
" 1911	18,263,310	45,177,106	Imp. 26,913,796
Silver			
Sept. 1912	6,011,221	3,648,883	Exp. 2,362,338
" 1911	4,940,391	4,161,706	Exp. 778,685
Year 1912	52,347,946	36,301,752	Exp. 16,046,194
" 1911	49,527,961	33,696,430	Exp. 15,831,531

Exports from the port of New York, week ended Nov. 2: Gold, $14,056; silver, $1,286,280, to London and Paris. Imports: Gold, $131,678; silver, $111,836, from Mexico and South America.

Gold—Prices on the open market in London remained at the usual level, 77s. 9d. per oz. for bars and 76s. 4d. per oz. for American coin. There was some competition for the supplies arriving, but not sufficient to draw out any premium prices.

Platinum—The market is steady and unchanged. Dealers here continue to ask $45.50 per oz. for refined platinum and $48 per oz. for hard metal, up to 10% iridium.

Our Russian correspondent writes under date of Oct. 24 that the market and prices are without change. Considerable quantities of platinum have been sold this fortnight. A new company, with a capital of $7,500,000 is founded for working platinum mines in the northern Urals. It is proposed to install five or six dredges on its mines. Till now these placers have been worked by the staratelli.

The quotations are, in St. Petersburg, 37,500 rubles per pood; at Ekaterinburg, 9.80 rubles per solotnik, for crude metal, 83% platinum—equivalent to $36.75 and $36.85 per oz., respectively.

Iridium—Prices are firm and unchanged at $68@70 per oz., New York.

Palladium—There is some demand for this metal, and $72 per oz. is quoted.

Silver—The market has been quiet and dull with a lower tendency on account of higher rates for money, induced by the Balkan War. The market closes steady at 28 13/16d. in London.

SILVER AND STERLING EXCHANGE

Oct.-Nov.	31	1	2	4	5	6
New York	62⅞	62⅛	62¾	62⅞	....	62⅜
London	29	28⅞	29	29	28 13/16	28 13/16
Sterling Ex.	4.8570	4.8540	4.8560	4.8565	....	4.8555

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Exports of silver from London to the East, Jan. 1 to Oct. 24, as reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India	£7,275,600	£8,791,500	I. £1,515,900
China	989,700	1,066,000	I. 76,300
Total	£8,265,300	£9,857,500	I. £1,592,200

Imports of silver into France, eight months ended Aug. 31, were 184,399,000 fr.; exports were 178,098,000 fr.; excess of imports, 6,301,000 fr., against 35,155,000 fr. last year.

Copper, Tin, Lead and Zinc

NEW YORK

Oct.-Nov.	Copper: Lake, Cts. per lb.	Copper: Electrolytic, Cts. per lb.	Tin: Cts. per lb.	Lead: New York, Cts. per lb.	Lead: St. Louis, Cts. per lb.	Zinc: New York, Cts. per lb.	Zinc: St. Louis, Cts. per lb.
31	17⅛@17¾	17.10@17.15	50¼	4.95@5.00	4.80@4.82½	7.30@7.40	7.15@7.25
1	17.40@17.60	17.05@17.15	50¾	4.87½@4.90	4.72½@4.75	7.30@7.40	7.15@7.25
2	17.40@17.60	17.05@17.15	50¾	4.82½@4.87½	4.67½@4.72½	7.30@7.40	7.15@7.25
4	17.40@17.60	17.05@17.15	50¼	4.70@4.75	4.55@4.60	7.30@7.40	7.15@7.25
5	.....	.....	....	.....	.....	.....	.....
6	17.40@17.60	17.10@17.15	50	4.70@4.75	4.55@4.60	7.30@7.40	7.15@7.25

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. and that for casting copper usually about 0.125 to 0.2c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market for good ordinary brands, both desilverized and non-desilverized; specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium.

LONDON

Oct.-Nov.	Copper: Spot	Copper: 3 Mos	Copper: Best Sel'td	Tin: Spot	Tin: 3 Mos	Lead, Spanish	Zinc, Ordinaries
31	75¼	75⅞	80½	229¼	229¼	19¼	27⅜
1	75⅝	76	81	230	229¾	19	27⅜
2	....	....	.....	.....	.....	....	....
4	75½	76¼	80½	229	229¼	18 15/16	27⅜
5	76	76⅝	81	227½	227½	18½	27¾
6	76	76⅝	81	228	228	18 1/16	27¾

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £15 = 3.26c.; £25 = 5.44c.; £70 = 15.22c. Variations, £1 = 21¾c.

Copper—Although the week Oct. 31-Nov. 6 was a broken one, a larger volume of business than in the previous week was reported. Electrolytic copper was offered all along at 17¼c., delivered, usual terms, and that price was shaded materially on domestic business in order to make sales. Under this pressure by certain producers several million pounds were placed at receding prices. At the end of the week, however, it looks as if this selling had been finished and an improvement in the market is expected. The European statistics for the second half of October showed a decrease in the stocks of about 2300 tons, and reports from abroad are to the effect that consumers are poorly supplied and must soon come into the market. During the week no business in Lake copper has been reported, and quotations are but nominal. The market closes with Lake copper nominally at 17.40@17.60c.; electrolytic in cakes, wirebars or ingots at 17.10@17.15c.; casting copper is quoted nominally at 16.95@17.05c. as an average for the week.

The standard market has been without special feature and fluctuated within narrow limits, spot ruling around £75 10s. and three months £76 2s. 6d. At the close, the market was firmer, due to bear covering and some bull speculation, and the final figures are £76 for spot and £76 2s. 6d. for three months.

Copper sheets are 23@24c. per lb., base for large lots. Full extras are charged and higher prices for small quantities. Copper wire is 19@19¼ base, carload lots at mill.

Copper exports from New York for the week were 3697 long tons. Our special correspondent gives the exports from Baltimore at 3994 tons for the week.

Tin—The market ruled quiet but firm throughout the week. The figures published the beginning of the month once more established the very excellent statistical position of the metal. Speculatively this fact is also expressed in the confidence with which future material is being bought, so that spot and future prices in the London market are now on an equal basis. Business here is not very active, and while stocks in the hands of consumers must be very much diminished, they are aware that there is at present no scarcity of material and therefore are not anxious to replenish the same. The market closes steady at £228 for spot and three months in London, and about 50c. for November tin in New York.

Lead—The market has been weak. There has been considerable pressure to sell, in the face of a small demand. Consumption continues good, but buyers being well covered for the time being are holding off, apparently looking for lower prices. The close is quoted 4.70@4.75c., New York, and 4.55@4.60c., St. Louis.

The European market for lead has also declined, owing to the fact that there has been more lead offering and that the consumption has fallen off slightly, due to the decreased demand for white lead. At the close, Spanish lead is quoted £18 1s. 3d., English lead 2s. 6d. higher.

By a clerical or typographical error, we gave the London quotation for Spanish lead on Aug. 13, 1912, as £19⅞ instead of £19⅜, the latter figure being the correct one. The correct average price of Spanish lead in London for the month of August was £19.655, instead of £19.679, as then given.

Spelter—The market is unchanged. There is a fair demand, which is being freely met, and the metal is quoted 7.15@7.25c., St. Louis, and 7.30@7.40c., New York., according to delivery, metal for early shipment remaining somewhat scarce.

The London market is unchanged, good ordinaries being quoted £27 7s. 6d., specials £27 12s. 6d. per ton.

Base price of zinc sheets is $9 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8% discount.

Zinc dust is quoted 7¾c. per lb., New York.

Other Metals

Aluminum—The market continues strong and sales are good. Current quotations here are 27c. per lb. for No. 1 ingots, New York, for early delivery. Higher prices, up to 28@29c. per lb., are asked for futures.

The latest London quotation for ingots is £81@85 per long ton, according to size of order and delivery. This is equivalent to 17.60@18.47c. per lb., November and December delivery.

Antimony—Sales are good and the market is firm. Cookson's is quoted at 10⅜@10½c. per lb.; Hallett's at 9¾@10c.; while 9⅜@9⅝c. is named for Hungarian, Chinese and other outside brands.

Quicksilver—Business is good and the market here is steady, but with no material change in prices. New York quotations are $42@42.25 per flask of 75 lb., with 60c. per lb. asked for retail lots. San Francisco, $41.50 for domestic orders and $39 for export. London price has been reduced to £7 12s. 6d. per flask, with the same quotation given from second hands.

Nickel—Shot, blocks and plaquettes bring 40@45c. per lb., according to quality. Electrolytic nickel is 3c. per lb. higher.

Selenium—Producers of this metal quote large lots at $2.75@3.50 per lb., according to size of order; while as high as $4.50@5.50 is paid for retail lots.

Zinc and Lead Ore Markets

Platteville, Wis., Nov. 2—The highest premium price this week for zinc ore was $57; the base price of 60% zinc was $55 @56. No sales of lead ore were reported.

SHIPMENTS WEEK ENDED NOV. 2

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Benton	749,970	.....	884,700
Platteville	675,100	.....	82,000
Galena	641,800	.....	.....
Highland	294,000	.....	.....
Mineral Point	286,100	.....	.....
Shullsburg	260,000	147,700	.....
Cuba City	250,950	.....	121,660
Hazel Green	220,000	.....	.....
Montfort	70,000	.....	.....
Linden	66,260	.....	.....
Harker	62,950	.....	.....
Total	3,577,130	147,700	1,088,360
Year to date	168,985,850	7,218,960	31,129,950

Shipped during week to separating plants, 2,762,060 lb. zinc ore.

Joplin, Mo., Nov. 2—The high price for zinc sulphide ore was $61, the base per ton of 60% zinc, $52@58. Zinc silicate sold at $31@34 per ton of 40% zinc. The average price, for all grades of zinc, is $55.04 per ton. Lead, selling on a base of $61@62 per ton of 80% metal, brought no higher price than the top base price, no ore assaying over grade. The average of all grades of lead ore is $60.18 per ton.

SHIPMENTS WEEK ENDED NOV. 2

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	4,433,640	.....	634,340	$143,488
Joplin	3,037,140	.....	231,970	93,749
Alba-Neck	896,370	.....	17,200	26,509
Galena	707,820	.....	156,810	24,680
Duenweg	553,270	.....	51,510	17,061
Oronogo	375,300	.....	205,570	14,525
Carl Junction	405,700	.....	.....	12,374
Miami	377,790	.....	60,490	11,259
Granby	258,900	187,240	17,730	9,750
Cave Springs	248,370	.....	11,310	7,170
Jackson	203,180	.....	9,640	5,886
Spurgeon	57,480	218,990	18,840	5,811
Wentworth	88,020	.....	.....	2,200
Lawton	65,590	.....	.....	1,870
Carthage	65,000	.....	.....	1,755
Sarcoxie	63,000	.....	.....	1,701
Quapaw	63,110	.....	.....	1,577
Totals	11,899,680	406,230	1,415,410	$381,365
44 weeks	473,857,100	29,768,510	79,149,240	$15,403,480

Blende val., the week, $332,046; 44 weeks, $12,676,621
Calamine, the week, 6,723; 44 weeks, 469,726
Lead value, the week, 42,596; 44 weeks, 2,257,133

MONTHLY AVERAGE PRICES

Month	Zinc Ore: Base Price		Zinc Ore: All Ores		Lead Ore: All Ores	
	1911	1912	1911	1912	1911	1912
January	$41.85	$44.90	$40.55	$43.54	$55.68	$58.92
February	40.21	45.75	39.16	43.31	54.46	52.39
March	39.85	51.56	38.45	49.25	54.57	54.64
April	38.88	52.00	37.47	50.36	56.37	54.18
May	38.25	55.30	36.79	53.27	55.21	52.45
June	40.50	55.88	38.18	54.38	56.49	55.01
July	40.75	58.85	38.36	56.59	58.81	58.83
August	42.50	55.13	41.28	53.27	60.74	57.04
September	42.63	59.75	41.29	57.07	59.33	61.26
October	42.38	57.00	40.89	55.97	54.72	63.22
November	45.40	.....	43.25	.....	57.19	.....
December	44.13	.....	40.76	.....	62.03	.....
Year	$41.45	.....	$39.90	.....	$56.76	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

Chemicals

New York, Nov. 6—The general market continues active.

Arsenic—Receipts from Mexico have increased lately, relieving the situation greatly. The market is easier, $5@5.25 being paid for spot and $4.75 per 100 lb. for futures.

Copper Sulphate—Trade is good and the market is steady. Prices are unchanged at $5.50 per 100 lb. for carload lots, and $5.75 per 100 lb. for smaller parcels.

Nitrate of Soda—Trade is quiet and the market is a little easier, 2.57½c. per lb. being asked for all positions.

CURRENT WHOLESALE PRICES

Ammonium sulphate ..... cwt.	3.25@3.28
Arsenic, white ..... lb.	0.04¾@0.05¼
Barytes, ground ..... sh. ton	12.50@14.00
" floated ..... sh. ton	16.00@17.00
Calcium acetate, gray ..... cwt.	2.50@2.55
carbide, tons lot f.o.b., Niagara Falls ..... sh. ton	70.00
Carbons, good drill quality ..... carat	85.00
Cement, Port., Am. ..... 400-lb. bbl.	1.33
Chrome brick, f.o.b., Pittsburg ..... M.	175.00
ore, 50%, ex-ship, N. Y., lg. ton	14.00@16.00
Copperas, bulk ..... cwt.	0.55
bbl. ..... cwt.	0.65@0.85
Copper sulphate ..... cwt.	5.50@5.75
Fluorspar, lump, f.o.b. Pittsburg ..... ton	8.00@9.00
Magnesite, crude, 95% ..... lg. ton	10.00@11.00
calcined, powdered	30.00@35.00
brick, dom., f.o.b. Pittsburg ..... M.	160@180
Paints, litharge, Am. powd ..... lb.	0.07@0.07¼
red lead, American ..... lb.	0.07@0.07¼
white lead, Am., dry ..... lb.	0.05¾@0.06¼
zinc white, Am., dry ..... lb.	0.05¼@0.06¼
Phosphates, acid:	
*Fla., hard rock 77%	5.75@6.25
land pebble 68%	3.70@3.80
†Tenn., 78@80%	5.00@5.50
75%	4.75@5.00
68@72%	4.25@4.50
‡So. Car. land rock 60%	3.50@3.75
Potassium cyanide, 95@96% ..... lb.	0.24
Pyrite:	
Domestic, non-arsenical, furnace size, f.o.b. R.R. per unit	0 12@0.12½
Domestic, non-arsenical, fines, per unit, f.o.b. mines	0.11½@0.12
Imported, non-arsenical, furnace size, ex-ship, per unit	0.13½
Imported, arsenical, furnace size, size, ex-ship, per unit	0.13@0.13½
Imported, fines, arsenical, ex-ship	0.11½@0.12
Imported, fines, non-arsenical, ex-ship, per unit	0.12½
Pyrite prices are per unit of sulphur. A deduction of 25c. per ton from furnace-size price is made when ore is delivered in large lumps.	
Sodium cyanide, 120 to 130% KCN (per 100%) ..... lb.	0.21
nitrate 95% spot ..... cwt.	2.57½
95% future ..... cwt.	2.57½
Sulphur, Louisiana prime, N. Y., lg. ton	22.00@22.50
roll ..... cwt.	1.85@2.15
flour ..... cwt.	2.00@2.40
flowers, sublimed ..... cwt.	2.20@2.60
pow. com., bags ..... cwt.	1.50
Sicilian, crude brimstone lg. ton	22.50
Zinc chloride, granular ..... lb.	0.04¾@0.04¾

*F.o.b. Florida or Georgia ports. †F.o.b. Mt. Pleasant. ‡On vessel Ashley River, S.C.

Note—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites and sulphur, in which there are well established markets, the quotations are substantially representative. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in their selling output on private contract.

Petroleum

The monthly report of the *Oil City Derrick* shows new wells completed in October as follows: Pennsylvania, New York and West Virginia, 534; Lima-Indiana, 56; Kentucky, 10; Illinois, 146; Kansas-Oklahoma, 739; Texas-Louisiana, 145. In all the divisions 1633 wells were completed, having a new production of 57,857 bbl. This was an increase of 108 in the number of wells and a decrease of 3371 bbl. in new production. Of the new wells, 276 were failures, and 167 were gas producers, being an increase of 14 dry holes and 12 gas wells. The number of oil-producing wells was 1190. In September, the productive wells numbered 1108, 1272 in August and 1092 in July. At the close of October there were 519 rigs up and 1644 wells drilling, a total of 2163. These figures show a decrease of 60 in rigs, an increase of 180 in wells drilling, and a net increase of 120. The most of the new work is found in the Mid-Continent field.

Mining Stocks

New York, Nov. 6—On Oct. 31 the Exchange rallied a little, but declined and closed weak. On the Curb there was a good demand for copper stocks at slight advances. Other mining stocks also sold well and were fairly strong.

Nov. 1 trading on the Exchange was slow and changes small. The Curb also was slow and trading in mining stocks light. Nov. 2 the Exchanges were closed on account of the funeral of Vice-President Sherman.

Nov. 4 the Exchange was still weak and irregular, being affected to a considerable extent by the disturbances on the European markets. The Curb was inclined to be active, with some demand for mining stocks at generally firm prices. Nov. 5, Election Day, was a holiday.

The Listing Committee of the New York Curb Market Association has admitted to quotation the 900,000 common shares of the Oil Fields of Mexico Co., par value $5, of which 700,000 shares are outstanding; 200,000 shares of 7% preferred stock, par value $5, all outstanding; $1,000,000 6% bonds, due July 1, 1922, denomination $1000. Also 500,000 shares Lone Star Consolidated Mining Co., par $1 each.

At auction in New York, Oct. 31, a lot of 200 shares Colorado Fuel & Iron Co. common, $100 par, brought $35.12½ per share.

Boston, Nov. 5—It has been a dull and uninteresting week in the local stock market. Copper shares have been heavy for the most part without any particular offerings, although the final, up to election day, saw some stimulation in certain issues, which gave the market a good tone. There is very little incentive for trading, although sentiment continues optimistic as regards the metal shares.

Some strong spots have been witnessed in the cases of Granby, Mohawk, Old Dominion, Utah Consolidated, Wolverine, Superior Copper, North Butte and Calumet & Arizona; all of which showed advances.

COPPER SMELTERS' REPORTS

This table is compiled from reports received from the respective companies, except in the few cases noted (by asterisk) as estimated, together with the reports of the U. S. Dept. of Commerce as to imported material, and in the main represents the crude copper content of blister copper, in pounds. In those cases where the copper contents of ore and matte are reported, the copper yield thereof is reckoned at 95%. In computing the total American supply duplications are excluded.

Company	August	Sept.	October
Alaska shipments	1,242,836	1,726,715	.....
Anaconda	25,250,000	24,500,000	25,250,000
Arizona, Ltd.	3,260,000	3,340,000	.....
Copper Queen	8,040,424	9,103,861	8,184,575
Calumet & Ariz.	4,514,000	4,462,000	4,404,000
Chino	3,437,309	3,372,369	.....
Detroit	1,882,289	1,881,668	1,934,828
East Butte	1,410,500	1,250,000	.....
Mammoth	1,802,590	1,834,937	.....
Mason Valley	1,384,000	1,200,000	.....
Nevada Con.	.....	5,607,578	.....
Ohio	.....	.....	.....
Old Dominion	2,597,896	2,204,000	.....
Ray	2,888,095	2,978,405	.....
Shannon	1,400,000	1,142,000	1,210,000
South Utah	224,855	225,568	.....
United Verde*	2,500,000	2,750,000	.....
Utah Copper Co.	11,248,992	6,616,887	.....
Lake Superior*	21,000,000	19,250,000	.....
Non-rep. mines*	8,970,000	9,100,000	.....
Total production	.....	.....	.....
Imports, bars, etc.	23,561,161	.....	.....
Total blister	.....	.....	.....
Imp. in ore & matte	8,544,624	.....	.....
Total American	.....	.....	.....
Miami†	3,048,750	2,949,150	.....
Brit. Col. Cos.:			
British Col. Copper	941,364	.....	.....
Granby	1,970,388	2,083,118	.....
Mexican Cos.:			
Boleo†	.....	.....	.....
Cananea	4,044,000	3,500,000	.....
Moctezuma	3,229,839	771,844	3,045,667
Other Foreign:			
Cape Cop., S. Africa	.....	.....	.....
Kyshtim, Russia	.....	.....	.....
Spassky, Russia	902,720	981,120	.....
Famatina, Argen.	.....	.....	.....
Tilt Cove, Newf'd.	.....	.....	.....
Exports from:			
Chile	8,512,000	6,048,000	.....
Australia	8,064,000	7,616,000	.....
Arrivals in Europe‡	20,200,320	8,518,720	.....

†Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister.

‡Does not include the arrivals from the United States, Australia or Chile.

STATISTICS OF COPPER.

Month	U.S.Refin'y Product'n	Deliveries, Domestic	Deliveries for Export
X, 1911	118,255,442	64,068,307	60,084,349
XI	111,876,601	68,039,776	67,049,279
XII	122,896,697	65,988,474	79,238,716
Year	1,431,938,338	709,611,605	754,902,233
I, 1912	119,337,753	62,343,901	80,167,904
II	116,035,809	56,228,368	63,148,096
III	125,694,601	67,487,466	58,779,566
IV	125,464,644	69,513,846	53,252,326
V	126,737,836	72,702,277	69,485,945
VI	122,315,240	66,146,229	61,449,650
VII	137,161,129	71,094,381	60,121,331
VIII	145,628,521	78,722,418	70,485,150
IX	140,089,819	63,460,810	60,264,796
X	.....	.....	.....

VISIBLE STOCKS

	United States	Europe	Total
XI, 1911	134,997,642	176,825,600	311,823,242
XII	111,785,188	164,281,600	276,066,788
I, 1912	89,454,695	158,323,200	247,777,895
II	66,280,643	154,851,200	221,131,843
III	62,939,988	141,142,400	204,082,387
IV	62,367,557	136,819,200	199,186,757
V	65,066,029	134,176,000	199,242,029
VI	49,615,643	117,801,600	167,417,243
VII	44,335,004	108,186,000	152,521,004
VIII	50,280,421	113,299,200	163,579,621
IX	46,701,374	113,568,000	160,269,374
X	63,065,587	107,408,000	170,473,587
XI	.....	103,801,600	.....

Curb trading has been low and price changes unimportant for the most part. Butte Central has recovered some of its recent loss. This stock will go to the New York Curb during the week. Some of the penny stocks have been fairly active.

Assessments

Company	Delinq	Sale	Amt.
Alpha Con., Nev.	Nov. 13	Dec. 4	$0.03
Best & Belcher	Nov. 6	Nov. 25	0.05
Big Elk, Ida.	Oct. 9	Nov. 10	0.001
Black Horse, Ida.	Oct. 18	Nov. 8	0.01½
Buffalo, Ida.	Oct. 28	Nov. 28	0.002½
Consolidated Virginia, Nev.	.....	.....	0.15
Crown Point, Nev.	Nov. 11	Dec. 4	0.10
Crown Point, Utah	Nov. 15	Dec. 10	0.01
Eastern Star, Ida.	Oct. 12	Nov. 12	0.003
Exchequer, Nev.	Oct. 30	Nov. 20	0.03
Franklin, Mich.	Oct. 18	.....	2.00
Laclede, Ida.	Nov. 18	Dec. 9	0.003
Holy Terror, Ida.	Oct. 18	Nov. 18	0.00½
Hugo, Ida.	Nov. 9	Dec. 9	0.001
Indiana, Mich.	Oct. 16	.....	1.00
Lucky Calumet, Ida.	.....	Nov. 8	0.005
Mayflower, Ida	Nov. 27	Dec. 27	0.005
Meicher, Utah	Nov. 23	Dec. 12	0.02
National Copper, Ida.	Nov. 15	Dec. 10	0.01
Oneco, Mich.	Oct. 10	.....	1.00
Ophir, Nev.	Nov. 11	Dec. 9	0.15
Rhode Island, Ida.	Oct. 31	Nov. 30	0.00½
Sunshine, Ida.	Oct. 30	Nov. 30	0.001
Tar Baby, Utah.	Nov. 2	Dec. 2	0.002½
Utah Ideal, Utah	Oct. 9	Nov. 10	0.01½
Yellow Jacket, Nev.	Oct. 30	Dec. 3	0.10

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1910	1911	1912	1910	1911	1912
January	52.375	53.795	56.260	24.154	24.865	25.887
February	51.534	52.222	59.043	23.794	24.081	27.190
March	51.454	52.745	58.375	23.690	24.324	26.875
April	53.221	53.325	59.207	24.483	24.595	27.284
May	53.870	53.308	60.880	24.797	24.583	28.038
June	53.462	53.043	61.290	24.651	24.486	28.215
July	54.150	52.630	60.654	25.034	24.286	27.919
August	52.912	52.171	61.606	24.428	24.082	28.375
September	53.295	52.440	63.078	24.567	24.209	29.088
October	55.490	53.340	63.471	25.596	24.594	29.299
November	55.635	55.719	.....	25.680	25.649	.....
December	54.428	54.905	.....	25.160	25.349	.....
Year	53.486	53.304	.....	24.670	24.592	.....

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

	New York				London, Standard	
	Electrolytic		Lake			
	1911	1912	1911	1912	1911	1912
January	12.295	14.094	12.680	14.337	55.600	62.760
February	12.256	14.084	12.611	14.329	54.974	62.893
March	12.139	14.698	12.447	14.868	54.704	65.884
April	12.019	15.741	12.275	15.930	54.034	70.294
May	11.989	16.031	12.214	16.245	54.313	72.352
June	12.385	17.234	12.611	17.443	56.365	78.259
July	12.463	17.190	12.720	17.353	56.673	76.636
August	12.405	17.498	12.634	17.644	56.266	78 670
September	12.201	17.508	12.508	17.698	55.253	78.762
October	12.189	17.314	12.370	17.661	55.170	76.389
November	12.616	.....	12.769	.....	57.253	.....
December	13.552	.....	13.768	.....	62.068	.....
Year	12.376	.....	12.634	.....	55.973	.....

New York, cents per pound. London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Month	1911	1912	Month	1911	1912
January	41.255	42.529	July	42.400	44.519
February	41.614	42.962	August	43.319	45.857
March	40.157	42.577	September	39.755	49.135
April	42.185	43.923	October	41.185	50.077
May	43.115	46.053	November	43.125	.....
June	44.606	45.815	December	44.655	.....
			Av. Year	42.281	.....

Prices are in cents per pound.

LEAD

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	4.483	4.435	4.334	4.327	13.009	15.597
February	4.440	4.026	4.266	3.946	13.043	15.738
March	4.394	4.073	4.238	4.046	13.122	15.997
April	4.412	4.200	4.262	4.118	12.889	16.331
May	4.373	4.194	4.223	4.072	12.984	16.509
June	4.435	4.392	4.292	4.321	13.260	17.588
July	4.499	4.720	4.397	4.603	13.530	18.544
August	4.500	4.569	4.406	4.452	14.260	19.655
September	4.485	5.048	4.356	4.924	14.744	22.292
October	4.265	5.071	4.139	4.894	15.332	20.630
November	4.298	.....	4.181	.....	15.821	.....
December	4.450	.....	4.332	.....	15.648	.....
Year	4.420	.....	4.286	.....	13.970	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	5.452	6.442	5.302	6.292	23.887	26.642
February	5.518	6.499	5.368	6.349	23.276	26.661
March	5.563	6.626	5.413	6.476	23.016	26.048
April	5.399	6.633	5.249	6.483	23.743	25.644
May	5.348	6.679	5.198	6.529	24.375	25.790
June	5.520	6.877	5.370	6.727	24.612	25.763
July	5.695	7.116	5.545	6.966	25.006	26.174
August	5.953	7.028	5.803	6.878	26.801	26.443
September	5.869	7.454	5.719	7.313	27.750	27.048
October	6.102	7.426	5.951	7.276	27.256	27.543
November	6.380	.....	6.223	.....	26.795	.....
December	6.301	.....	6.151	.....	26.849	.....
Year	5.758	.....	5.608	.....	25.281	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

	Bessemer		Basic		No. 2 Foundry	
	1911	1912	1911	1912	1911	1912
January	$15.90	$15.12	$14.40	$13.32	$14.75	$14.00
February	15.90	15.03	14.50	13.28	14.81	14.01
March	15.90	14.95	14.65	13.66	14.96	14.10
April	15.90	15.13	14.65	13.90	15.00	14.15
May	15.90	15.14	14.30	13.90	14.72	14.12
June	15.90	15.15	14.06	14.11	14.56	14.22
July	15.90	15.15	14.03	14.38	14.53	14.38
August	15.90	15.43	14.00	14.90	14.47	14.85
September	15.90	16.86	13.57	16.03	14.40	15.63
October	15.43	17.90	13.44	17.18	14.34	17.22
November	14.92	.....	13.30	.....	14.25	.....
December	15.15	.....	13.10	.....	13.90	.....
Year	$15.72	.....	$13.94	.....	$14.49	.....

STOCK QUOTATIONS

COLO. SPRINGS Nov. 4

Name of Comp.	Bid.
Acacia	.04½
Cripple Cr'k Con.	.01½
C. K. & N.	.17½
Doctor Jack Pot.	.05½
Elkton Con.	.65½
El Paso	5.38
Findlay	.04½
Gold Dollar	.18½
Gold Sovereign	.02½
Isabella	.21½
Jack Pot	‡.04½
Jennie Sample	.06½
Lexington	.007
Moon Anchor	.01
Old Gold	‡.03½
Mary McKinney	.73
Pharmacist	.01½
Portland	1.00
Vindicator	.89
Work	‡.01

SALT LAKE Nov. 4

Name of Comp.	Bid.
Beck Tunnel	.08
Black Jack	.10
Cedar Talisman	.01
Colorado Mining	.15
Columbus Con.	.10
Crown Point	.02
Daly-Judge	‡5.90
Grand Central	.66
Iron Blossom	1.10
Little Bell	‡.20
Lower Mammoth	.06
Mason Valley	12.00
May Day	.15
Nevada Hills	1.40
New York	‡.01
Prince Con	1.77½
Silver King Coal'n	2.95
Sioux Con.	.02½
Uncle Sam	.13
Yankee	.15

TORONTO Nov. 5

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	7.50	Foley O'Brien	.22
Hudson Bay	‡63.00	Hollinger	15.00
Temiskaming	.39	Imperial	.02½
Wettlaufer-Lor.	.25	Pearl Lake	.22
Am. Goldfield.	‡.40	Porcu. Gold.	.18½
Apex	‡.01½	Preston E. D.	.03
Crown Chartered.	.03½	Rea	.33
Dobie	.25	Standard	‡.01
Dome	20.00	Swastika	.08½
Dome Exten.	.11½	West Dome	‡.13

SAN FRANCISCO Nov. 4

Name of Comp.	Clg.	Name of Comp.	Bid
COMSTOCK STOCKS		MISC. NEV. & CAL.	
Alta	‡.05	Belmont	9.12½
Belcher	.25	Jim Butler	.72
Best & Belcher	‡.04	MacNamara	.21
Caledonia	‡.90	Midway	.45
Challenge Con.	‡.05	Mont.-Tonopah	2.05
Chollar	‡.03	North Star	.39
Confidence	‡.45	West End Con.	1.62½
Con. Virginia	.31	Atlanta	.18
Crown Point	.36	Booth	‡.06
Gould & Curry	‡.02	C.O.D. Con.	.07
Hale & Norcross	‡.14	Comb. Frac.	.12
Mexican	‡2.60	Jumbo Extension	.33
Occidental	‡.70	Pitts.-Silver Peak	.87
Ophir	‡.41	Silver Pick	.07
Overman	‡.45	St. Ives	‡.30
Potosi	‡.03	Tramp Con.	.02
Savage	‡.10	Argonaut	‡2.00
Sierra Nevada	‡.39	Bunker Hill	‡4.50
Union Con.	.62	Central Eureka	‡.20
Yellow Jacket	.40	So. Eureka	‡2.00

N. Y. EXCH. Nov. 4

Name of Comp.	Clg.
Amalgamated	83½
Am. Agri. Chem.	58
Am.Sm.&Ref.,com	82½
Am. Sm. & Ref., pf.	107½
Am. Sm. Sec., pf. B	85½
Anaconda	43
Batopilas Min.	1⅜
BethlehemSteelpf	74
Chino	45⅝
Federal M. &S., pf.	45½
Goldfield Con.	2⅜
GreatNor.,ore.,ctf.	47
Guggen. Exp.	‡54¼
Homestake	‡98½
Inspiration Con.	19¾
Miami Copper	27¼
Nat'nalLead,com.	63
National Lead, pf.	109½
Nev. Consol.	21
Phelps Dodge	‡215½
Pittsburg Coal, pf.	92
Ray Con.	21¾
Republic I&S,com.	31¾
Republic I & S, pf.	92½
SlossSheffi'd,com.	54
Sloss Sheffield, pf.	95
Tennessee Copper	40¾
Utah Copper	62⅛
U. S. Steel, com.	76
U. S. Steel, pf.	‡114
Va. Car. Chem.	47¼

N. Y. CURB Nov. 4

Name of Comp.	Clg.
Barnes King	‡.60
Beaver Con.	.42
Braden Copper	7
B. C. Copper	4½
Buffalo Mines	2¼
Caledonia	.40
Con. Ariz. Sm.	⅛
Davis-Daly	2⅛
Diam'field-Daisy	6
Ely Con.	.20
Florence	.77
Giroux	4⅝
Gold Hill Con.	⅛
Greene Cananea	9⅞
Greenwater	.05
Internat. S. & R.	‡124
Kerr Lake	2⅜
Keystone	2
La Rose	2½
McKinley-Dar-Sa.	1⅞
Min. Co. of A. new	2⅞
Motherlode Gold.	‡⅛
Nev. Utah M. & S.	‡.01
Nipissing Mines	8½
Ohio Copper	1⅝
Pacific Sm. & M.	⅛
Puebla S. & R.	‡1 1/16
South Live Oak	2
South Utah M. &S.	⅝
Standard Oil (Old)	1110
Stand'd Oil of N.J.	394
Stewart	1 1/16
Tonopah	6¾
Tonopah Ex.	2 1/16
Tonopah Merger	.96
Tri-Bullion	¾
Tularosa	1 1/16
Union Mines	‡.10
United Cop., pfd.	10
Yukon Gold	3 5/16

LONDON Nov. 6

Name of Com.	Clg.
Camp Bird	£1 5s 3d
Dolores	1 10 0
El Oro	1 1 3
Esperanza	1 19 3
Mexico Mines	6 15 0
Oroville	0 5 3
Stratton'sInd.	0 3 1½
Tomboy	1 7 0

BOSTON EXCH. Nov. 4

Name of Comp.	Clg.
Adventure	6
Ahmeek	330
Algomah	‡3
Allouez	39½
Am. Zinc	30¾
Ariz. Com., ctfs.	‡3¾
Bonanza	.30
Boston & Corbin	6
Butte & Balak	3¾
Calumet & Ariz	76¾
Calumet & Hecla	550
Centennial	19
Cliff	‡3
Copper Range	54½
Daly West	3¾
East Butte	15
Franklin	10
Granby	65
Hancock	22½
Hedley Gold	25
Helvetia	.75
Indiana	14¼
Island Cr'k, com.	55
Island Cr'k, pfd.	‡86½
Isle Royale	31¾
Keweenaw	‡2
Lake	27¾
La Salle	4¾
Mass	6¾
Michigan	1½
Mohawk	62
New Arcadian	‡2½
New Idria Quick	7
North Butte	34¾
North Lake	3½
Ojibway	‡3
Old Dominion	59¾
Osceola	107¾
Quincy	81⅝
Shannon	14
Shattuck-Ariz.	28
Superior	41
Superior & Bost.	‡1¾
Tamarack	41
Trinity	4¼
Tuolumne	2¾
U. S. Smelting	45½
U. S. Smelt'g, pf.	50½
Utah Apex	2
Utah Con.	11¼
Victoria	2⅛
Winona	4
Wolverine	76½
Wyandot	1¾

BOSTON CURB Nov. 4

Name of Comp.	Last
Alaska Gold M.	8
Bingham Mines	4
Boston Ely	1
Boswyocolo	.01
Butte Central	6
Cactus	07
Calaveras	2 1/16
Chief Cons	1
Corbin	3
Cortez	3
Crown Reserve	3 7/16
First Nat. Cop.	2 1/16
Majestic	.41
Mazatan	‡
Moneta Porc.	‡.04
Nevada-Douglas	3
New Baltic	1
Oneco	2
Raven Copper	.30
Rhode Island Coal	‡.22
San Antonio	‡3
Smokey Dev.	2
S. W. Miami	5
South Lake	6
Trethewey	‡.30
United Verde Ext.	.53

‡Last quotation.